Self-assessment

This section is designed to test your knowledge of selected topics in this issue of the journal. The correct answers are given on the next page.

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SINGLE BEST ANSWER

1 A 25-year-old female is posted for caesarean section in 72 hours at 36 weeks for fetal IUGR. Regional anaesthesia is contraindicated due to previous major spinal surgery and general anaesthesia is planned instead. She is very anxious about the drugs used for anaesthesia and pain management at the pre-assessment. Which of the following drugs cross the placenta more when compared to the others?

- **A.** ☐ Etomidate achieves very high fetal plasma concentration when administered at induction
- **B.** ☐ Fentanyl has a greater transit than morphine as it is relatively more lipophilic
- **C.** ☐ Suxamethonium crosses the placenta easily due to less ionization
- **D.** ☐ Glycopyrrolate crosses the placenta more than atropine when given intravenously
- **E.** ☐ Dexamethasone used to promote fetal lung maturity rapidly passes across the placenta when administered

2 A 30-year-old primi has been in labour for almost 14 hours which has been augmented with a syntocinon infusion. Electronic fetal monitoring (EFM) shows an abnormal heart rate and suggests fetal distress. She is considered for an emergency caesarean section but there is an unexpected delay as the surgeon is finishing another emergency procedure. Which of the following is true regarding the management of this patient while awaiting caesarean section?

- **A.** ☐ In the presence of an abnormal fetal heart rate the predictive value of EFM is around 90% for fetal acidosis
- **B.** ☐ Oxygen 15 l/min should be administered via non-rebreathing mask immediately
- **C.** ☐ An increase in fetal oxygen levels may not necessarily result in an improved fetal acid-base status
- **D.** ☐ Cessation of syntocinon infusion will immediately reduce the strength of uterine contractions
- **E.** ☐ The left lateral position is always beneficial in reducing fetal distress

MULTIPLE CHOICE QUESTIONS

3 Spinal-induced hypotension at caesarean section

Which of the following are risk factors for developing hypotension following spinal anaesthesia in the obstetric population?

- **A.** ☐ Prolonged labour
- **B.** ☐ High pre-operative anxiety
- **C.** ☐ Low baseline heart rate
- **D.** ☐ High heart rate variability
- **E.** ☐ Recent history of supine hypotensive syndrome

4 Non-neuraxial analgesia in labour

Which of the following are true regarding the remifentanil and its use as a patient controlled analgesia in labour?

- **A.** ☐ Remifentanil PCA lowers pain scores more effectively than entonox
- **B.** ☐ Maternal satisfaction scores with remifentanil are much less compared to satisfaction scores with epidurals
- **C.** ☐ Remifentanil reduces pain scores more than pethidine in the first hour of administration but the difference does not remain significant after this time.
- **D.** ☐ Remifentanil does not cross the placenta to a significant degree
- **E.** ☐ Remifentanil PCA carries a higher risk of maternal sedation and pruritus than fentanyl PCA

5 Pre-eclampsia and the anaesthetist

Which of the following are true about the management of pre-eclampsia?

- **A.** ☐ Pre-eclampsia can be diagnosed as early as 10 weeks in women at high risk
- **B.** ☐ High dose folic acid is highly beneficial in preventing pre-eclampsia in high risk women
- **C.** ☐ Pulmonary oedema remains the most common cause of death in women with pre-eclampsia
- **D.** ☐ $MgSO_4$ infusion when used prophylactically may be stopped only 12 hours postpartum without a major difference in maternal outcome compared to 24 hours
- **E.** ☐ Obesity is one of the risk factors in developing pre-eclampsia

6 Uterine physiology

Which of the following are true regarding the nerve supply of uterus?

- **A.** ☐ The body of the uterus is supplied predominantly by parasympathetic fibres
- **B.** ☐ The sympathetic nerves pass via the superior hypogastric plexus
- **C.** ☐ The uterine nerves come from the inferior hypogastric plexus
- **D.** ☐ Afferent pain fibres from the cervix pass via sympathetic fibres in T10—L1
- **E.** ☐ Sympathetic activation normally produces uterine inhibition and vasodilatation

ANSWERS

1. Correct Answer: E. Many drugs are able to cross the placenta and can have a harmful effect on the fetus at any time during pregnancy. Drugs administered during the first trimester may produce congenital malformations. Those given in later trimesters may cause problems that affect the growth or functional development of the fetus or may even be toxic to fetal tissue. Small hydrophobic compounds are rapidly transported from mother to fetus by flow-limited passive diffusion. Hydrophilic drugs diffuse more slowly. Their diffusion is membrane limited but may still pose a threat to the fetus (e.g. transport of teratogenic substances). During parturition, anaesthetic agents are often administered. Inhaled substances such as nitrous oxide are lipid soluble and pass rapidly from mother to fetus, and a similar situation is seen with respect to some induction agents. Thiopental can reach levels in the fetus approaching those of the mother only 1 minute after injection. Etomidate is less lipophilic and crosses the placenta more slowly. Muscle relaxants such as suxamethonium are highly ionized and do not pass across the placenta easily. Anticholinergic agents such as atropine may cross the placenta easily, but those with a more polar structure (e.g. glycopyrrolate) do not pass across so readily. Many anticholinesterase agents are quaternary ammonium compounds (e.g. neostigmine and edrophonium) and due to their polar nature do not quickly pass across the placenta. Opioids may be highly lipophilic (e.g. morphine) and can rapidly cross the placenta, with levels in the fetus approaching those in the mother. However, some agents such as fentanyl show higher albumin binding in plasma, which reduces their relative lipophilicity and consequently their transit across the placenta. Oral anticoagulants are teratogenic. Corticosteroids vary in their ability to cross the placenta. Some, such as betamethasone and dexamethasone, will cross easily, whereas 88% of prednisolone is inactivated as it crosses the placenta. The major concerns regarding prolonged or repeated administration in pregnancy are that fetal adrenal suppression may occur and that there is an increased risk of intrauterine growth restriction. Glucocorticoids are used to promote fetal lung maturity when preterm birth is implicated, and it is therefore important that these agents can rapidly pass across the placenta when administered.

2. Correct Answer: C. While waiting for caesarean section, measures aimed at intrauterine fetal resuscitation should be attempted. Continuous EFM in labour has a high sensitivity but low specificity. In the presence of a normal fetal heart rate (FHR) pattern there is a 99% predictive value for a non-acidotic fetus. Conversely, in the presence of an abnormal FHR pattern the predictive value drops to 50% for fetal acidosis. Utilization of tools such as fetal scalp blood sampling allow direct measurement of fetal acidosis and therefore decrease rates of operative deliveries for false-positive FHR patterns.

Maternal oxygen saturation only increases by 2–3% when oxygen is administered. This effect is achieved with relatively modest increases in FiO2 (0.3% or greater). Even though healthy women in labour have high SpO_2 and oxygen content is close to maximum, it has been shown that maternal oxygen administration increases fetal oxygen levels. This is believed to be secondary to maximizing maternal oxygen partial pressure. Oxygen is transferred to the fetus via passive diffusion. Although, an increase in fetal oxygen levels may improve an abnormal fetal heart trace, it may not necessarily result in an improved fetal acid-base status.

It was unable to evaluate the effectiveness of oxygen in fetal distress due to the absence of any trials. In clinical practice maternal oxygen should be used for maternal hypoxia. Short-term oxygen therapy (15–30 minutes) for intrauterine resuscitation may be warranted after other interventions have been attempted. In the presence of uterine hyperstimulation, or in cases of presumed fetal acidaemia without facility to immediately expedite delivery, then fetal oxygenation can be improved by reduction in uterine contractions. Reduction (or cessation) of syntocinon will decrease uterine contractility. However, this is not an instant effect with only a 48% reduction in contractions at 45 minutes. For rapid cessation of uterine activity the recommended tocolytic is terbutaline 250 mg SC or IV. The left lateral position is advocated on the assumption that aortocaval compression exists. However, in the case of umbilical cord compression, the left lateral position will not result in improvement and may cause a further deterioration in the FHR.

3. Correct answers: B, D, E

4. Correct answers: A, C, E

5. Correct answers: D, E

6. Correct answers: B, C