O1 Quantification of haemodynamics and myocardial tissue characteristics in healthy pregnant women and women with preeclampsia using cardiac magnetic resonance

SS Chen, L Leeton, AT Dennis
Department of Anaesthesia, Royal Women's Hospital, Parkville, Australia

Introduction: In preeclampsia (PE) women have increased cardiac output, reduced diastolic function, pericardial effusions and increased left ventricular (LV) wall diameters on echocardiography (TTE). Women with PE also have higher cardiovascular system risk in later life that may be related to PE induced changes within the myocardial tissue (oedema or fibrosis). TTE cannot differentiate between causes of increased wall thickness and cannot characterize the myocardium therefore it is uncertain whether this finding on TTE in women with PE is true LV hypertrophy or myocardial oedema and whether fibrosis is present. Cardiac magnetic resonance (CMR) is a new non-invasive imaging technique can assess haemodynamics and characterise myocardial tissue. There are no studies of CMR in women with PE. We aimed to determine myocardial structure using CMR in healthy pregnant (HP) and PE women.

Methods: After institutional ethics approval and written consent, from June 2014-April 2015 36 women (31 HP; 5 PE) underwent CMR. HP women were ASA 1 on no medication and non-smokers. PE women had pregnancy-onset hypertension with evidence of end-organ dysfunction. Women with chronic hypertension, multiple pregnancy, body mass index (BMI) >45 kg/m^2 were excluded. CMR imaging was analysed using CMRtools (Cardiovascular Imaging Solutions, UK) for volumetric analysis and semi-quantification of STIR (short-tau inversion recovery) images for myocardial oedema assessment. Myocardial oedema was assessed by measuring myocardial signal intensity and comparing to signal intensity from skeletal muscle closest to the heart (serratus anterior). Myocardial intensities were measured from 16 LV segments (basal=6, mid-chamber=6, apical=4) and averaged to obtain a global myocardial signal intensity. Myocardial oedema was defined as a myocardial:skeletal tissue intensity ratio of ≥2.0.

Results: The mean±SD age, gestation and BMI for HP and PE women was 33±4.5 vs 36±3.4 years (*P*=0.22), 36±3.9 vs 33±5.0 weeks (*P*=0.29), 30±5.0 vs 28±2.1 kg/m (*P*=0.15) respectively.

Table: Structure and function data

	HP	PE
Systolic BP (mmHg)	117 ± 11.1	142 ± 14.7*
Diastolic BP (mmHg)	69 ± 9.3	88 ± 9.2*
LVEDV (mL)	130 ± 22.1	134 ± 31.5
LV ejection fraction (%)	64 ± 5.2	65 ± 6.0
LV mass (g)	127 ± 20.1	151 ± 43.8
Cardiac output (mL/min)	6.6 ± 1.3	6.0 ± 1.2
Heart rate (beats/min)	75 ± 11.0	73 ± 9.4
Myocardial:skeletal intensity	1.1 ± 0.15	1.6 ± 0.47*

*P<0.05 (one-sided unpaired t-test Welch's correction)

Discussion: CMR can quantify haemodynamics and characterise myocardial tissue in HP women and in women with PE. Our data suggest that women with PE have a different myocardial wall composition and this may be due to oedema not muscle. Further work is needed to investigate this novel finding.

O2 Fibrinogen concentrate versus placebo for treatment of postpartum haemorrhage: a multicenttre, prospective, double-blind randomised control study (OBS2)

D Bruynseels, J Dick*, CD Elton†, S Mallaiah§, RE Collis on behalf of OBS2 collaboration
*Anaesthetics, University Hospital of Wales, Cardiff, UK, *Anaesthetics, University College London Hospital, London, UK, †Anaesthetics, University Hospitals of Leicester, Leicester, UK, §Anaesthetics, Liverpool Women's Hospital, Liverpool, UK*

Introduction: A low fibrinogen is associated with progression of postpartum haemorrhage (PPH)[1] but it is unknown whether early replacement improves outcomes. In the absence of timely coagulation results, many centres use early fixed ratios of red blood cells (RBC) and fresh frozen plasma (FFP) to treat presumed haemostatic impairment. FFP is associated with adverse events and it is not known whether withholding FFP based on point of care testing is safe. We investigated Fibtem-guided early fibrinogen replacement and FFP transfusion in moderate/severe PPH.

Methods: With consent, women with ongoing PPH (1000-1500 mL) were screened for enrolment into an MREC-approved multicentre double-blind randomised controlled trial. Fibtem A5 was performed at enrolment and repeated after every 500 mL blood loss or for clinical concern; no FFP or fibrinogen was infused if Fibtem A5 was >15 mm. If the Fibtem A5 was ≤15 mm, women were randomised to fibrinogen concentrate or placebo. The primary outcome was the number of allogeneic blood products (RBC, FFP, cryoprecipitate, platelets) transfused.

Results: The study enrolled 653 women of whom 55 had a Fibtem A5 <15 mm and were randomised: 28 to fibrinogen; 27 to placebo. The fibrinogen and placebo arms received a total of 58 and 75 allogenic units, respectively; this was almost entirely due to a difference in FFP transfusion (18 vs 33 units). The adjusted incidence rate ratio (95% CI) for allogeneic products in the fibrinogen arm compared to placebo was 0.72 (0.30 to 1.70, *P*=0.45). Any transfusion was required in 53.6% of the fibrinogen and 55.6% of the placebo arm. In pre-specified subgroup analysis, the median [IQR] allogeneic units transfused in women with fibrinogen <2g/L in the fibrinogen (n=3) and placebo (n=4) arms was 1 [1-8] and 7[4-16], respectively. In women with a Fibtem A5 <12 mm, allogeneic units transfused were 1 [0-4.5] for fibrinogen (n=13) and 3 [0-6] for placebo (n=15). Of the 653 women, 598 (92%) maintained a Fibtem A5 >15 mm, indicating adequate haemostasis throughout. Of the 598 women, 23% received RBCs, 2% FFP and 82% had ≤1 invasive procedures to control bleeding.

Discussion: Haemostatic impairment is uncommon in moderate/severe PPH (<8%). Withholding FFP if Fibtem A5 is >15 mm does not impair outcomes. Early fibrinogen replacement, triggered by a Fibtem A5 ≤15 mm, was not associated with a statistically significant reduction in allogeneic transfusion although fewer units of FFP were transfused. Subgroup analyses support investigation of a lower intervention trigger for fibrinogen replacement.

Disclosure: This study received funding from CSL Behring.

Reference

1. Collins PW, Lilley G, Bruynseels D, et al. Fibrin-based clot formation as an early and rapid biomarker for progression of postpartum hemorrhage: a prospective study. Blood 2014;124:1727-33

O3 Transnasal Humidified Rapid-Insufflation Ventilatory Exchange (THRIVE): an optimal method of pre-oxygenation for general anaesthesia in obstetrics

E McMaster, E Gent, T Mahendrayogam, A Surendran
Anaesthetics, Queen Elizabeth Hospital, Kings Lynn, UK

Introduction: General anaesthesia (GA) in obstetrics is known to be a high-risk endeavour due to the physiological changes in pregnancy and an increased incidence of difficult airway.[1] A rapid-sequence induction (RSI) is standard for both elective and emergency procedures. Avoidance of hypoxaemia is key to preventing detrimental outcomes when a prolonged intubation is encountered. Pre-oxygenation allows creation of an oxygen (O_2) reservoir, reducing rapid onset of hypoxaemia during the apnoeic period.[2] Apnoeic oxygenation transnasally at high flow rate has been shown to be beneficial in delaying intubation in patients with respiratory failure.[3] Benefits during induction and emergence from GA are also proven in the non-obstetric population.[4] OAA/DAS airway guidelines recommend nasal O_2 supplementation. We share our experience of introducing the technique in obstetrics.

Methods: Our established practice of THRIVE for intubation in intensive care and high risk GAs facilitated a smooth start in obstetrics. THRIVE was commenced from the time of arrival in theatre and continued during transfer to the operating table, induction and laryngoscopy until tracheal tube is secured. We aimed to achieve the recommended 10-min duration. Maternal and neonatal data are presented.

Results: We did not achieve the recommended period of pre-oxygenation; shortest being 7 min (mean 9 min). We used THRIVE for eight category-1 caesarean sections and two cases of surgical control of postpartum haemorrhage. The lowest SpO_2 was 94% (mean 98%). Maternal body mass index ranged from 19 to 51 kg/m2. Median apnoea time was 40 seconds, (longest 180 seconds). There was one anticipated difficult airway, and two cases needing more than one intubation attempt. There were no untoward neonatal outcomes among the caesarean group. The lowest Apgar score was 7 at 1 min and mean pH was 7.23.

Discussion: From our experience THRIVE can be used effectively for obstetric GAs. Supplemental maternal oxygenation does not seem to pose any additional risks to the neonate, although larger comparative studies may be required to confirm this.[5] We also found the technique allowed 'hands free' pre-oxygenation allowing other aspects of a category-1 caesarean section to be carried out. We recommend THRIVE as a superior alternative to standard pre-oxygenation in obstetrics.

References

1. Kinsella SM, Winton ALS, Mushambi MC. Failed tracheal intubation during obstetric general anaesthesia: a literature review. Int J Obstet Anesth 2015; 24: 356-74
2. Tanoubi I. Oxygenation before anaesthesia in adults. Anaesthesiology Rounds 2006; 5: 1-6
3. Kang BJ, Koh Y, Lim CM. Failure of high-flow nasal cannula therapy may delay intubation and increase mortality. Intensive Care Med 2015; 41: 623-32
4. Patel A, Nouraei SAR. Transnasal Humidified Rapid-Insufflation Ventilatory Exchange (THRIVE): a physiological method of increasing apnoea time in patients with difficult airway. Anaesthesia 2015; 70: 323-9
5. Ngan Kee WD, Khaw KS,Randomized, double-blind comparison of different inspired oxygen fractions during general anaesthesia for caesarean section. Br J Anaesth 2002; 89: 556-61

O4 Efficacy and safety of intravenous carbetocin as a bolus compared to a short infusion for caesarean section

S Dell-Kuster, I Hoesli*, O Lapaire*, E Seeberger, LA Steiner, HC Bucher†, T Girard
*Anaesthesiology, University Hospital, Basel, Switzerland, †Basel Institute for Clinical Epidemiology and Biostatistics, University Hospital, Basel, Switzerland, *Obstetrics and Antenatal Care, University Hospital, Basel, Switzerland*

Introduction: Carbetocin is a synthetic oxytocin-analogue with a longer half-life.[1] Oxytocin is known to cause less cardiovascular side effects when administered as a short infusion.[2] We compared the application of carbetocin as a slow intravenous bolus with application as a short infusion in women undergoing a caesaren section (CS). We hypothesised that uterine contraction would not be inferior after a short infusion than after a bolus.

Methods: In this randomised, double-blind, investigator-initiated non-inferiority trial. with ethics approval and informed consent, women undergoing a planned or unplanned CS under neuraxial anaesthesia received a bolus and a short infusion, one of which contained carbetocin 100 µg (double dummy). Obstetricians quantified uterine tone 2, 3, 5 and 10 min after cord clamping by manual palpation using a linear analogue scale ranging from 0 to 100. We evaluated whether the lower limit of the 95% confidence interval (CI) for the difference of the maximal uterine tone within the first 5 min after cord clamping between both groups did not include the pre-specified non-inferiority limit of -10.

Results: 140 patients were enrolled, 69 (49%) in the bolus, 71 (51%) in the short infusion group. Baseline characteristics were similar. Maximal uterine tone was 89 in the bolus and 88 in the short infusion group (mean difference -1.3, 95% CI -5.7 to 3.1). Blood pressure was similar (mean difference in mean arterial pressure -2 mmHg, 95% CI -5 to 1), but 36 (52%) in the bolus and 29 (41%) in the short infusion group received phenylephrine during the period carbetocin administration. Calculated blood loss, use of additional uterotonics and side effects were comparable.

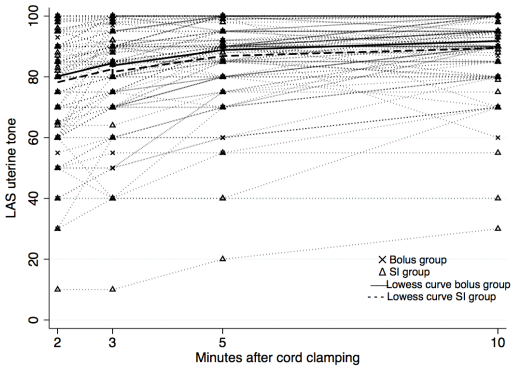

Figure: Uterine tone after carbetocin administration

Discussion: Administration of carbetocin as a short infusion does not compromise uterine tone. In concordance with oxytocin, carbetocin can safely be administered as a short infusion during caesarean section.

References

1. Su LL, Chong YS, Samuel M. Carbetocin for preventing postpartum haemorrhage. Cochrane Database of Syst Rev 2012; 4: CD005457
2. Thomas JS, Koh SH, Cooper GM. Haemodynamic effects of oxytocin given as i.v. bolus or infusion on women undergoing Caesarean section. Br J Anaesth 2007; 98:116-9