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the assembled device. The supervising anaesthetist was able to observe LOR by using the second LOR syringe and intervened as necessary. Participants were given real-time feedback on failure, false and successful detection of LOR, these attempts were recorded. Participants were also asked to grade the degree of LOR supervision (1 – continuous supervisor-needle contact, 2 – intermittent, 3 – occasional, 4-no supervisor-needle contact).

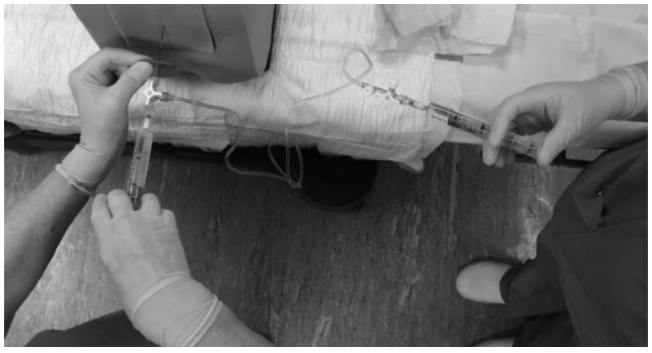

**Figure:** LOR resistance technique using two syringes

**Results:** For the intermittent LOR technique, 15 participants (39.5%) detected LOR, 11 (28.9%) detected false LOR and 12 (31.6%) failed to detect LOR. For the continuous LOR technique 10 participants (26.3%) detected LOR, 13 (34.2%) detected false LOR and 15 (39.5%) failed to detect LOR. For grading the degree of LOR technique supervision, 29 participants (76.3%) graded it as 4 and 9 (23.7%) as 3.

**Discussion:** This device assembly could help novice anaesthetic trainees to practice LOR technique under direct supervision but with minimal or no supervisor-needle contact. Using the second LOR syringe to detect missed or false LOR by the supervisor could help to prevent ADP.

## References

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## P.7 Clopidogrel and the newer antiplatelets with a focus on regional anaesthesia: A systematic review

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**Introduction:** Increasing numbers of women are established on antiplatelets medications at conception or during pregnancy, however, little evidence exists to inform management including intrapartum use of regional anaesthesia (RA), beyond aspirin. We aimed to systematically review contemporary data on the safety of clopidogrel and newer antiplatelet agents in pregnant women, with particular attention to RA.

**Methods:** The review protocol was published via PROSPERO (ID 42020165235) and conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta- Analysis. Databases were searched using MeSH and free text terms encompassing the included antiplatelets, relevant indications, and pregnancy. Included studies reported the drug dose, stage of pregnancy it was administered, and at least one primary or secondary outcome relating to pregnancy. The primary outcome was reporting of complications associated with antiplatelet use in pregnancy.

**Results:** The search yielded 5271 results. 39 publications were included, incorporating 42 live births. The mean age of women was 34.6 years. Seven different antiplatelet agents were described, clopidogrel being most frequent (n = 37). Two women developed bleeding post caesarean section. There were no recorded neonatal delivery complications. Two neonates had congenital anomalies not felt to be related to maternal antiplatelet use. In total, 14 women had RA. 12 while taking clopidogrel (11 as a dual antiplatelet agent (DAPT) with aspirin and one as a single agent). Clopidogrel was stopped one week before delivery in 8/12 (66.7%), in the remaining four cases it was stopped between 2-6 weeks before delivery. In three cases DAPT (aspirin and clopidogrel) was continued throughout delivery. One women was taking prasugrel and aspirin (stopped one week prior to delivery) and one was taking ticagrelor and aspirin (stopped two weeks prior to delivery). There were no documented maternal or neonatal delivery complications in women who underwent RA.

**Discussion:** This systematic review describes reassuring outcomes for both mothers and neonates when exposed to clopidogrel at varying durations throughout gestation, with congenital anomaly rate comparable to background risk. Evidence for other antiplatelet agents, other than aspirin, remains limited. The European Society of Anaesthesiology recommend that clopidogrel is withheld seven days prior to RA. They recommend prasugrel be held for seven days and ticagrelor 72 h.[1] Our findings would support that RA should be offered, with recommendation to stop prior to delivery in line with national guidance and in the context of individualised decision making.

## References

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## P.8 Anaesthetic outcomes in pregnancy complicated by SARS-CoV2

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**Introduction:** In December 2019 the emergence of a novel coronavirus (SARS-CoV-2) was reported in China. The World Health Organisation formally recognised this outbreak as a pandemic in March 2020. Despite a large number of case reports and series on COVID-19 in pregnancy, there is a paucity of information about anaesthetic outcomes. We aimed to conduct a secondary analysis for anaesthetic outcomes from a large systematic review of COVID-19 in pregnancy.[1]

**Methods:** We reviewed all manuscripts in the largest systematic review to date, of COVID-19 in pregnancy.[1] Those that did not describe clinical course or anaesthetic outcomes in the mother were excluded. The remaining studies were analysed for details of anaesthesia, including anaesthesia for caesarean section (CS) and labour analgesia.

**Results:** A total of 86 manuscripts were reviewed. Three papers not in the English language were excluded. A further 16 manuscripts in which maternal clinical course or outcomes were not a primary focus of the case report or series were also excluded, leaving 67 manuscripts, and a total of 2260 patients. Of these 67 manuscripts, 15 explicitly discussed the provision of anaesthesia, in a total of 182 patients. Anaesthesia for CS was described in 180 patients; 34 (19%) of these patients received general anaesthesia, 144 (80%) received neuraxial anaesthesia and two (1%) patients received general anaesthesia after

initial neuraxial anaesthesia. In 30 of the 34 patients who had a CS under general anaesthesia, it is unclear if the general anaesthetic was administered for maternal respiratory distress or as a primary choice for CS. Of the 144 patients who had regional anaesthesia for CS, 130 (90%) had an unspecified neuraxial technique, ten (8%) received a combined spinal-epidural and four (2%) had a single shot spinal. Epidural for labour analgesia was described in two patients. One of these patients delivered spontaneously and one via emergency CS, with mode of anaesthesia for CS not described. There were no reports of anaesthetic complications.

**Discussion:** Information to date suggests that the provision of anaesthesia for labour and CS does not require significant modification. Early concerns that COVID-19 may be commonly associated with thrombocytopenia and prohibit neuraxial anaesthesia appear unfounded.[2] However, descriptions of thrombocytopenia in patients with even mild COVID-19 would support routine assessment of platelet counts before neuraxial anaesthesia.[3] General anaesthesia appears to have been used more frequently for emergency CS, possibly reflecting care of women with severe respiratory compromise.

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## P.9 Therapy optimization in massive obstetric haemorrhage

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**Introduction:** Correction of hypofibrinogenaemia during active bleeding requires large volumes of FFP, which may contribute to haemodilution or transfusion-associated circulatory overload (TACO) and transfusion-related acute lung injury (TRALI).[1] The objective of this work was to define the role of the cryoprecipitate (CP) and prothrombin complex concentrate (PCC) in massive obstetric haemorrhage of the frequency and severity of clinical manifestations of the multiple organ dysfunction syndrome (MODS).

**Methods:** Upon approval of study design by the ethics committee, 140 women from 2006 to 2018, whose delivery or early postpartum period was complicated by acute severe blood loss with a circulating blood volume deficit of 40-60% were examined. Based on the intensive treatment characteristics, patients were divided into 3 groups. In group 1 (post-hoc analysis, n = 50), acute blood loss with intensive treatment was provided as per relevant Ukrainian National Protocol (UNP). In group 2 (n = 44), an acute blood loss with intensive treatment as per UNP with use of the CP as the first- line drug was provided. In group 3 (n = 46), PCC (20 IU/kg) was added to treatment. We assessed RBC count, Hb, Ht, PI, aPTT, fibrinogen, and water sectors of the human body. Clinical signs of MODS included myocardial insufficiency, respiratory dysfunction and acute kidney injury.

**Results:** The use of CP as a first-line drug at a dose of 8-10 units resulted in decrease in total volume of infusion and transfusion by 13.7% ($P < 0.05$), and total volume of FFP by 12% ($P < 0.05$). Adding PCC to the Intensive Treatment Guidelines resulted in a reduction of the total volume of infusion and transfusion by 24.5% ($P < 0.01$), administered plasma volume by 22% ($P < 0.01$) and corpuscular volume by 9.1%, ($P < 0.05$). Furthermore, a decrease in the vasopressor support rate (by 5.1 times, $P < 0.01$) and in the vasopressor support duration (by 1.5 natural days, $P < 0.01$), as well as in the ALV rate and duration (by 5.7 times, $P < 0.01$), was observed; the number of the patients needing diuretics was reduced (by 2.9 times, $P < 0.01$), as well as the duration of administration (by 1.7 natural days, $P < 0.01$). The PI and fibrinogen rates had been corresponding to normal by the end of the first day of treatment.

**Discussion:** The use of CP as a first-line drug in the intensive treatment of an massive obstetric haemorrhage ensures a significant reduction in the need for infusion and transfusion. PCC as a first-line drug prevented development and progress of coagulopathy during treatment of massive obstetric haemorrhage, and decreased the frequency and severity of clinical manifestations of the MODS.

## References

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## P.10 Bedside haemostasis measurement and risk of neuraxial block in preeclampsia

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**Introduction:** Preeclampsia (PE) can cause abnormalities of haemostasis that increase risk of spinal haematoma with neuraxial block. Risk is stratified using platelet count (Plt) and PT/APTT (coag). If Plt $< 100 \times 10^9$/L, risk is increased, and further elevated by abnormal coag, falling Plt and HELLP syndrome (haemolysis, elevated liver enzymes and low platelets). Guidance advises results within 6 h,[1] but if unavailable, general anaesthesia may be required, with increased risks in PE. The study aim was to assess whether bedside measures of haemostasis can provide equivalent risk assessment to laboratory tests for performance of neuraxial block.

**Methods:** Following ethics approval, women with PE and healthy pregnant controls were recruited (excluded if aspirin/anticoagulant treatment/coagulation disorder). Blood was taken for Plt, PT/APTT, rotational thromboelastometry (ROTEM) and platelet aggregometry (ROTEM Platelet, RP). RP parameters were: maximum slope (MS), amplitude at 6 min (A6), area under curve (AUC). RP reagents; ADP (adenosine diphosphate), ARA (arachidonic acid) and TRAP (thrombin activating peptide). ROTEM parameters were: EXTEM clotting time (CT), amplitude at 5 min (A5), FIBTEM A5. Clot elasticity (Ce Plt, measure of platelet contribution to clot) was calculated.[2] Results were compared for control and PE groups.

**Results:** Number recruited was 57 (controls), 71 (PE); 86% had severe PE including 4 HELLP. Median [IQR (range)] Plt count was significantly lower in the PE group (185, [155–238] (61–443 $\times 10^9$/L)) vs. controls (227, [183–268] (126–364 $\times 10^9$/L)) ($P < 0.005$). 6/71 (8%) women with PE had Plt$< 100 \times 10^9$/L, three of whom had Plt $< 75 \times 10^9$/L. PT and APTT were not prolonged in any participants, but APTT was shortened in 35% with PE and 18% of controls. There was no difference in RP, ROTEM parameters or coag between control and PE groups. However, PE women with Plt$< 100 \times 10^9$/L had a lower ADP AUC, EXTEM A5 and Ce Plt than PE women with Plt $> 100 \times 10^9$/L (median 50 vs. 107, $P = 0.0075$, 44 vs 54, $P < 0.0001$ and 54 vs. 95, $P < 0.0001$,