Coagulation in pregnancy

Obstetric haemorrhage as defined by blood loss of >500ml occurs in 5% of deliveries. The haemostatic changes of pregnancy are profound and blood becomes increasingly prothrombotic through pregnancy. Large increases in the levels of fibrinogen as well as Factors VII, X, and XI and minor decreases in physiological anticoagulants such as antithrombin III and protein S, along with a hypofibrinolytic state produce a thrombophilic state at delivery [1]. Accordingly haemostasis is well placed to compensate for minor, or single defects in coagulation provided the deficit is not extreme.

Platelet count and epidural haematoma

The expansion of the circulation associated with pregnancy reduces the platelets count. Thresholds for thrombocytopenia vary from 150 x 10⁹ g/dL to 100 x 10⁹ g/dL and counts between these thresholds are common in mothers at delivery [2]. Very low platelet counts are a concern to obstetric anaesthetists because of the risk of haemorrhage within the bony confines of the spine leading to paraplegia as a result of cord compression from a spinal haematoma following regional blockade. This is a rare complication in any surgical population, and in obstetric practice it is too rare to give a clear incidence. There is a single report of an epidural haematoma in a pregnant woman occurring in the presence of thrombocytopenia (71 x 10⁹ g/dL) [3]. The debate regarding the safety of neuraxial blockade in women with thrombocytopenia is never going to be addressed by a clinical trial. For the foreseeable future, clinical practice will be guided by expert consensus opinion.

Platelet count and neuraxial block

An oversimplified and unsupported view of the risk of spinal haematoma is that there is a platelet count above which it is safe to perform the block, and below which, it is not. Over the years we have seen this arbitrary count reduce perhaps because complications are so few, but nevertheless risks should be acknowledged. Provided that a low count is clearly stable, maternal health is good, and there are normal fibrinogen levels, INR and APTT, then expert opinion is that neuroaxial blockade can be justified provided the platelet count is 50 x 10⁹.
2 g/dL or above. Such situations should not be regarded as routine and are for a skilled and experienced anaesthetist. Two relatively common conditions that meet these criteria are gestational thrombocytopenia and immune thrombocytopenia.

Pre-eclampsia and HELLP
In pre-eclampsia the low-grade activation of coagulation accelerates [1], increasing the risk of venous thromboembolism in the already prothrombotic pregnant circulation. For a minority, consumption is greater than activation, and the platelet count and/or other haemostatic variables may become depleted and varying degrees of a more widespread coagulopathy are evident. Abnormalities in the coagulation screen, a falling platelet count below 75 x 10⁹ g/dL that is clearly unstable, and poor maternal health militate towards a more cautious approach. These cases must be assessed on their merits, weighing up the risks of epidural haematoma against the desirability of regional analgesia or the undesirability of general anaesthesia.

When the diagnosis lies outside the diagnostic groups discussed, the same principles should be observed.

Smaller needles
Needle trauma is proportional to needle gauge. Lack of data does not permit a comparison of risk of spinal haematoma for epidural versus spinal, but consensus is that spinal needles are safer because they are smaller [3].

Tests of platelet function
Potentially available tests of platelet function include the gold standard but expensive and time consuming platelet aggregation studies conducted by some coagulation laboratories; point of care assessments are provided by the platelet function analyser and different forms of thromboelastography. Paradoxically, the more sophisticated and sensitive the test, the less value it has for the obstetric anaesthetist in an immediate situation.

Platelet aggregation studies are regarded by many as the best and most sophisticated tests of platelet function. In their attempt to isolate all compounding variables a laboratory protocol is used to standardise platelet count [4]. They are of value in thrombocytopenia but take too long to organise and complete in an urgent clinical situation. The platelet function analyser is less sophisticated, but it does isolate other influences at work on coagulation. The impact of platelet count is unlikely to be seen unless counts are low [5,6]. Devices that assess the visco-elastic forces at play during whole blood coagulation, like the Thromboelastogram, are of value, although not affected by aspirin without a special protocol. It reflects most changes in haemostasis including prothrombin and bleeding states. The assessment of platelet function is in terms of clot strength, and as this is an in vivo assessment, it is dependent on fibrinogen levels, which are usually very high at term. The overall effects of the normal hypercoagulable state of pregnancy and deficits in the coagulation process can be evaluated together in a single trace. If the question asked by the obstetric anaesthetist is ‘Will this blood clot?’, then at present this is most likely to answer the question.

Critics of point of care coagulation monitoring point out that the reliability and safety of these devices when used to guide clinical decisions has never been established. Given the nature of the problem, this is unlikely to change.
Manipulating low platelet count
Local guidelines for platelet transfusion may vary. If operative delivery is planned, transfusion should be explored with the anaesthetic, obstetric and haematology teams when the count is below $80 \times 10^9 \text{ g/dL}$ [2]. If vaginal delivery is planned, a lower threshold of $50 \times 10^9 \text{ g/dL}$ applies.

In an emergency, an alternative approach is to use desmopressin, which promotes platelet activation. The recommended dose is $0.3 \mu\text{g/kg}$ intravenously over 30 minutes. It works within 30 minutes and is effective for hours. Because it causes ADH secretion it can lead to water retention, and care must be exercised in pre-eclamptics receiving intravenous fluids. It is associated with an increased rate of thrombosis.

References