My pregnant patient proposed for a C-section has a history of intracranial arteriovenous malformation... what now?

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Introduction: Intracranial arteriovenous malformations (AVM) are congenital vascular anomalies resulting in a direct shunt between small arteries and veins in the cerebral or cerebellar circulations, bypassing normal capillaries¹. Resulting vessels are devoid of elastic layer and their respective muscular layer is small, leading to increased frailty. Clinical presentation predominates in the 4th decade, often as intracranial bleeding, focal neurologic signs or seizures^{1, 2}.

Contextualizing the problem

- Mortality for intracranial bleeding during labour: up to 40%
- AVM implicated in around half of these cases
- Responsible for 5-12% of overall obstetric mortality¹
- Risk of 1st rupture during pregnancy: 3,5%^{1, 3}
- Risk of re-rupture during pregnancy: ↑ (up to 26-30%?)^{1, 2}

Table 1- Facts to consider: AVM and pregnancy.

Case report: Term pregnancy (39W+4D) in a 30-year-old, ASA III patient with AVM discovered 7 years before in the diagnostic workup of severe headache. She had had 3 attempts at endovascular embolization, the last one 5 years previously, unable to completely resolve the problem but with a marked decrease in AVM dimensions. She maintained regular follow-up as an outpatient, and was found not to have a contraindication for pregnancy.

Admitted for elective C-section, with no neurologic signs, namely no signs of increased intracranial pressure. A subarachnoid block was performed, with an L3-L4 approach with 27G pencil-point needle, allowing for continuous neurologic monitoring throughout the operation. She remained haemodynamically stable, with no significant neurologic signs either intra- or post-operatively, and a healthy baby boy was born with a 9/10/10 Apgar score.

Even though ICU was on stand-by for this patient, there was no need to admit her there, and the post-operative period was uneventful. She was discharged home on the 4th postoperative day, returning to normal follow-up by Neurology as an outpatient.

Figure 1- Possible strategies following the diagnosis of AVM during pregnancy.

Discussion: The anaesthetic approach to a pregnant patient with an AVM has certain specificities at different times of patient care:

- Clarification of the diagnosis
- Stabilization of baseline condition
- Decision regarding pregnancy
- Preparation for birth
- Preparation for definitive treatment

There is no clear-cut consensus as to the best anaesthetic approach, but some concepts deserve particular attention:

GENERAL ANAESTHESIA

- Adrenergic response during ETT insertion
- ↑BP during anaesthetic emergence
- Reaction to ETT and Valsalva
- PONV
- Control over ventilatory pattern

LOCOREGIONAL ANAESTHESIA (NEUROAXIS)

- Clinical neurologic monitoring

Subarachnoid Block

- Quick installation of sympathetic block
- Dural puncture with 27G, pencil-point needle
- PONV and opioids?

Epidural block

- Gradual installation of sympathetic block
- Risk of accidental dural puncture with 18G, Tuohy needle
- PONV and opioids?

The use of uterotonic drugs should be made with particular care given its potential for adverse cardiovascular effects (hypotension and tachycardia with oxitocin; hypertension with methilergonovine and carboprost).

Take-home messages:

- A multidisciplinary approach is of utmost importance and these patients should be timely signalled so that a proper investigation can be made and the best therapeutic approach decided between neurosurgeons, obstetricians and anaesthesiologists, but also involving neonatology and intensive care units;
- Because all anaesthetic techniques have advantages and disadvantages, one should choose the one with whom he/she is most familiar, though always trying to maintain cardiovascular stability, avoid Valsalva maneuvers and ensure adequate neurologic monitoring;
- There must be adequate post-operative monitoring, for the risk remains elevated in this period⁴.

References

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