Posterior fossa surgery during pregnancy?

David Netuka, MD, PhD., Prof. Vladimir Benes, MD, PhD.

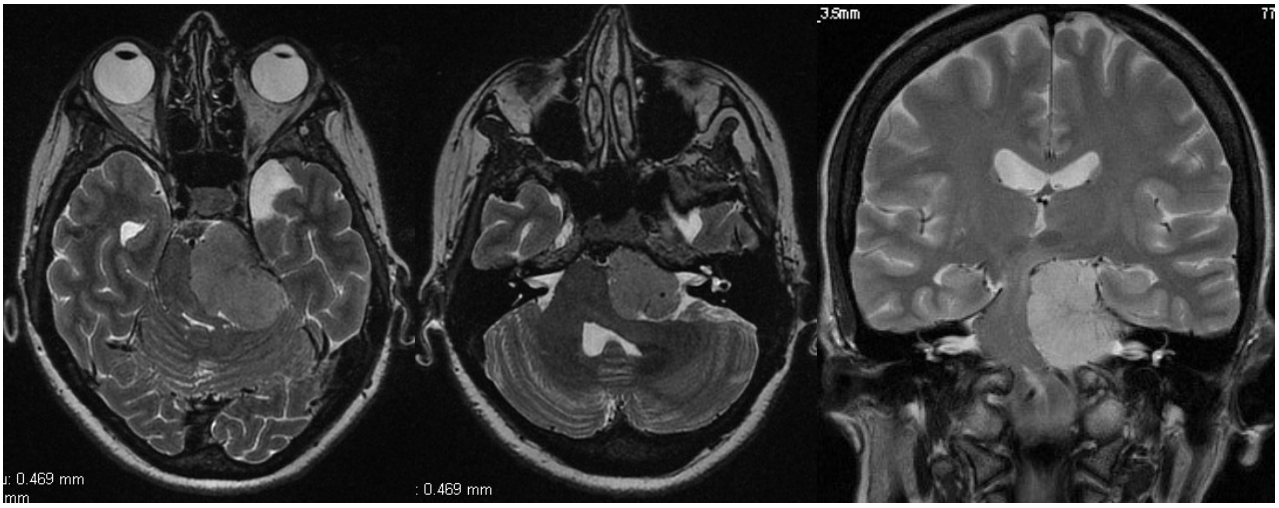
Department of Neurosurgery, Central Military University Prague

Introduction

Neurosurgical interventions during pregnancy are relatively infrequently performed (1,2). Considerations concerning neurosurgical intervention harbour specific aspects of pregnancy. The neurosurgeon has to decide whether the intervention is indicated as a priority or whether it could be postponed until full-term delivery. The week of gestation is highly important in the decision-making process. Reaching a decision is relatively easy if gestation is more than 32 weeks. The procedure is either postponed for a few weeks and neurosurgical intervention is performed after full-term delivery (usually caesarean section), or if a semiurgent procedure is needed, an immediate caesarean section may be performed with relatively low risk for the child. Neurosurgical intervention is then performed after the caesarean section. Of course, the particular type of neurosurgical procedure is important in the decision-making process.
The need for neurosurgical intervention during week 26-30 of gestation represents a more complex situation. Postponing the intervention for several weeks is probably the best option though this may not be possible in all cases. The decision then has to be taken whether to perform the procedure during pregnancy or to perform a caesarean section of an immature infant.

History

During the past 2 months, a 33-year-old female suffered paresthesias of the left part of her face and double vision when looking to the left. This lady was in her 24th week of pregnancy. At the time she had one healthy3-year-old boy.
Neurological examination revealed mild hypesthesia of the left part of her face and partial lesion of the left abducens nerve. MRI without contrast application was performed.



Questions & Answers 1

1. **What is the lesion?**
   It is definitely an extracerebral tumour compressing the brain stem. Because of its shape, type of growth and location, it is most probably meningioma.

2. **What would be your treatment plan?**
   Our initial plan was simple. The best option would be a watch and wait strategy until the end of pregnancy. Then we planned to perform surgery after caesarean section.

   The patient's condition significantly deteriorated over a relatively short (3-week) period. She was loosing the ability to walk because of progressive ataxia. She became apathetic and soon developed swallowing problems.

3. **What could be the cause of the patient's clinical deterioration?**
   We believed that hydrocephalus could explain the clinical deterioration.We would have perfomed IIIrd ventriculostomy or V-P shunt placement if this condition would had been the cause of her clinical deterioration.

   New MRI scanning was performed to verify the cause of her rapid clinical deterioration. However, MRI did not show signs of hydrocephalus. There was no change in the size of the tumour and no new oedema in the brain stem or cerebellum. Hence, the cause of her clinical deterioration was not clear. Nevertheless, we speculated that the possible cause of the deterioration was the impaired venous drainage due to even minimal growth of the tumour.

4. **What should be done in such a situaition? Should caesarean section be performed in the 27th week of pregnancy followed by either surgery or petroclival meningioma surgery in the pregnant woman?**
   Sound scientific data to be used as part of the decision-making process in this particular situation are lacking and only a few case series have been published thus far (3-6).

5. **What are the estimates of mortality, major morbidity and cranial nerve palsy in a published series of petroclival meningiomas in non-pregnant women?**
   Mortality 0-10%, major morbidity 8-45% and cranial nerve deficits 20-54% (7).

   Neonatologists' estimate that the risk of a newborn's major morbidity is about 10% in the case of preterm delivery in the 27th week of pregnancy with an estimated weight of 800g.

6. **Who should make the decision in this situation?**
   There are no scientific data to support such a decision. We therefore decided to call a multidisciplinary meeting that included obstetricians, neonatologists and anesthetists. Obstetricians were in favour of an immediate caesareansection based on the premise that the primary interest should be on aspects of maternal health (mother first policy). Neonatalogists, on the other hand, preferred delaying a caesarean section as long as possible because of risk of major morbidity of the immature newborn. Anesthetists considered major surgery and postoperative care in the pregnant woman as a viable option. There was no unanimous agreement among the various specialists.

7. **Should the patient herself make the final decision?**
   The patient was not in a condition to make such an important decision. We discussed the situation with the patient's husband. He made it clear that he and his wife were not able to decide what alternative was better and therefore asked us to do what we believed would be the best for the patient and newborn.

8. **One could not avoid having different thoughts related to the patient and her unborn child, such as the newborn may be severly disabled in case of immediate caesarean section, the pregnant woman may suffer major morbidity after neurosurgical intervention, or that the husband of the patient may end up with one healthy 3-year-old boy and a disabled newborn and a wife with a major neurologic deficit. Is such a way of thinking justified?**
   There is no simple answer to this question. Nevertheless, one has to admit that such subconscious thougths might lead to a recommedation to carry out surgery during pregnancy, which would provide an opportunity to cure the patient and prolong the pregnancy as long as possible.

9. **Which approach should be used for this petroclival meningioma?**
   One could use either a simple approach (such as the suboccipital retromastoidal) or a more complex skull base approach (such as the presigmoidal transpetrosal approach). Our team is very much in favour of the suboccipital retromastoidal approach in these cases because of its simplicity and the virtual absence of morbidity that is associated with the approach. Many authors have shown that such a "simple and most importantly routine" approach is sufficient in the majority of these cases (7).

Short description of the procedure

The procedure starts with the insertion of lumbar drainage. Surgery was perfomed in supine position, head rotation to the right, flexion of the neck and tilting of the surgical table to the right. Electrophysiological monitoring was performed using MEPs, SSEPs and cranial nerve monitoring. All of the tumour in the posterior fossa was resected, with only a small part in Meckel's cave intentionally left in place because of the risk of further trigeminal nerve deterioration and also to shorten the surgery. Foetal ultrasonography was perfomed after surgery and no alteration of the foetus was observed.
The patient was awake and oriented on the first postoperative day. She had a new abducens nerve palsy and hypacusis. The patient started intensive rehabilitation, improved her swallowing within a few days. She was able to start walking again with minor cerebellar ataxia.

Histological finding: atypical meningioma, grade II, Ki index 7%.

The patient delivered a healthy boy in the 38th week of her pregnancy.

She has permanent hypacusis on the left side and hypesthesia of the left side of her face. All other symptoms eventually resolved. She is able to take care of both children and actively engages in various activities (e.g., skiing and bicycle riding). Her Karnofsky score was 100, indicating "perfect" health. Residuum of the tumour in Meckel's cave is stable 1 year post-surgery.

Questions & Answers 2

10. **What to do with the residual tumour?**
    Because of the risks, surgery is not indicated. Either a watch and wait strategy may be applied or radiosurgery performed in the event of grade I meningioma. In such an event we would be slightly in favour of the watch and wait strategy and radiosurgery only if there is evidence of tumour growth.

    We recommend upfront radiosurgery if grade II meningioma. The pregnancy and period of lactation were the primary reasons for the 1-year delay of radiosurgery.

Conclusion

Based on this case report, we cannot claim that petroclival meningioma surgery in the 27th week of pregnancy should be the standard procedure. We want to underline the complexity of the decision-making process in this particular case. In certain situations the decision is based more on experience, emotions, intuition and philosophy than on evidence-based medicine (i.e. informed and calculated decisions).
Please feel free to send us any commentaries or ideas with respect to the present case.

Literature

1. Cohen-Gadol AA, Friedman JA, Friedman JD, Tubbs RS, Munis JR, Meyer FB (2009) Neurosurgical management of intracranial lesions in the pregnant patient: a 36-year institutional experience and review of the literature. J Neurosurg 111:1150–1157

2. Nossek E, Ekstein M, Rimon E, Kupferminc MJ, Ram Z (2011) Neurosurgery and pregnancy. Acta Neurochir 153:1727–1735

3. Giannini A, Bricchi M (1999) Posterior fossa surgery in the sitting position in a pregnant patient with cerebellopontine angle meningioma. Br J Anaesth 82(6):941-4.

4. Kanaan I, Jallu A, Kanaan H (2003) Management Strategy for Meningioma in Pregnancy: A Clinical Study. Skull Base 13(4):197-203

5. Kasper EM, Hess PE, Silasi M, Lim KH, Gray J, Reddy H, Gilmore L, Kasper B (2010) A pregnant female with a large intracranial mass: Reviewing the evidence to obtain management guidelines for intracranial meningiomas during pregnancy. Surg Neurol Int 1:95

6. Zoli M, Faustini-Fustini M, Mazzatenta D, Pasquini E, Frank G (2012) Tuberculum sellae meningioma growing during pregnancy: a difficult decision-making process. J Clin Endocrinol Metab 97(5):1418-9

7. Seifert V (2010) Clinical management of petroclival meningiomas and the eternal quest for preservation of quality of life: personal experiences over a period of 20 years. Acta Neurochir 152(7):1099-116