

Ganglioneuroblastoma during pregnancy – A rare case report

M.A. Moga¹, A. Daniilidis², N.F. Bigiu³, C. Andrei⁴, K. Dinas⁵, D.G. Festila⁶

¹ Obstetrics and Gynecology, Transilvania University of Brasov, Brasov (Romania)

² Obstetrics and Gynecology, Hippokratia General Hospital, Aristotle University of Thessaloniki, Thessaloniki (Greece)

³ Transilvania University of Brasov, Brasov (Romania)⁴ "Dr. I. A. Sbarcea" Clinical Obstetrics and Gynaecology Hospital, Brasov (Romania)

⁵ Hippokratia General Hospital, Aristotle University of Thessaloniki, Thessaloniki (Greece); ⁶ University of Medicine and Pharmacy Iuliu Hatieganu, Faculty of Dental Medicine, Maxillo-Facial Surgery and Radiology Department, Cluj-Napoca (Romania)

Summary

Purpose: To report a rare case of ganglioneuroblastoma encountered rarely in adults, especially during pregnancy. **Materials and Methods:** The authors present a case of ganglioneuroblastoma relapse during the third trimester of pregnancy in a patient previously treated for ganglioneuroblastoma who had a eight-year disease-free interval. Late manifestation of neurological symptoms (vestibular syndrome, nystagmus, slightly right motor deficit) was perhaps influenced by the hormonal pregnancy effects. In this case the option was for caesarean section under general anesthesia at 36 weeks. **Results:** Based on MRI result, the neurosurgical consultation stated the need of postpartum brain tumor excision. Recovery of the mother was complication-free with persistent, constant postoperative neurological symptoms. It resulted in a healthy newborn, not requiring special follow-up. **Conclusions:** Pregnancy and brain tumor have mutual negative effect on the patient. Therapeutic management in this case was a medical dilemma regarding mode setting and timing of delivery, taking into account the maternal-fetal risk-benefit.

Key words: Ganglioneuroblastoma; Pregnancy; MRI; Caesarian section.

Introduction

Ganglioneuroblastoma is a neuroblastic tumor containing malignant elements characteristic to neuroblastoma and benign elements found in ganglioneurinoma [1].

Intracranial tumors are extremely rare in pregnancy [2]. By their rarity and their diagnosis in the last trimester of pregnancy, intracranial tumors have an increased risk of maternal and fetal morbidity and mortality. Cranial tumors tend to increase and become symptomatic in the last trimester of pregnancy, while the exact causes are not entirely known [3]. Management of these cases should evaluate whether the mother's and the fetus' well-being are jeopardized. A multidisciplinary team will recommend the optimal time for delivery, as determined by the fetal lung maturity and mother's neurological condition [4].

The authors present a rare case of a 36-week pregnant woman with recurrence of ganglioneuroblastoma, eight years after complete surgical removal. The patient underwent caesarean section under general anesthesia with favorable postoperative outcome. So far, there are no well-established protocols regarding the management of intracranial tumors (especially ganglioneuroblastoma) in pregnant women.

Materials and Methods

Case report

A para 1, 20-year-old woman, was admitted to the present hospital due to irregular uterine contractions and vague neurological symptoms (vestibular syndrome, nystagmus, slightly right motor deficit), in her 36th week of gestation. Eight years earlier, in 2005, she was diagnosed with right parietal lobe ganglioneuroblastoma. She underwent complete surgical removal of the tumor, followed by radiochemotherapy and anticonvulsive therapy with phenytoin for about one year postoperative; y. Six years following treatment, the patient had no radiologic recurrence.

During her current pregnancy she had a routine follow up by her obstetrician. Pregnancy until the 36th week was uneventful and had no neurological symptoms until that point. She underwent the first trimester nuchal translucency ultrasound and the detailed second trimester ultrasound investigations, which were normal. On admission she went through MRI and interdisciplinary consultation by neurologists and neurosurgeons, who established the diagnosis of brain tumor, as a possible relapse of former pathology. Neurological examination revealed vestibular syndrome and nystagmus. Contrast MRI identified in the right parietal lobe, postcentral, a well-shaped image of 32-mm in diameter, nongadolinium-enhanced, sequel-looking (Figure 1). An area of edema with irregular outline in white matter was surrounding it. In the right temporal lobe, adjacent to the sylvian fissure, in hyposignal T2 image showed a nodular-shaped tumor of about seven-mm in diameter with discrete central heterogeneity (gadolinium-enhanced). There was no perilesional oedema. Ventricular system was located in the midline. MRI based neurosurgical consultation determined that the tumor was operable and stated the need of postpartum surgery (excision of the brain tumor). Preoperative the patient received corti-

Revised manuscript accepted for publication October 2, 2014

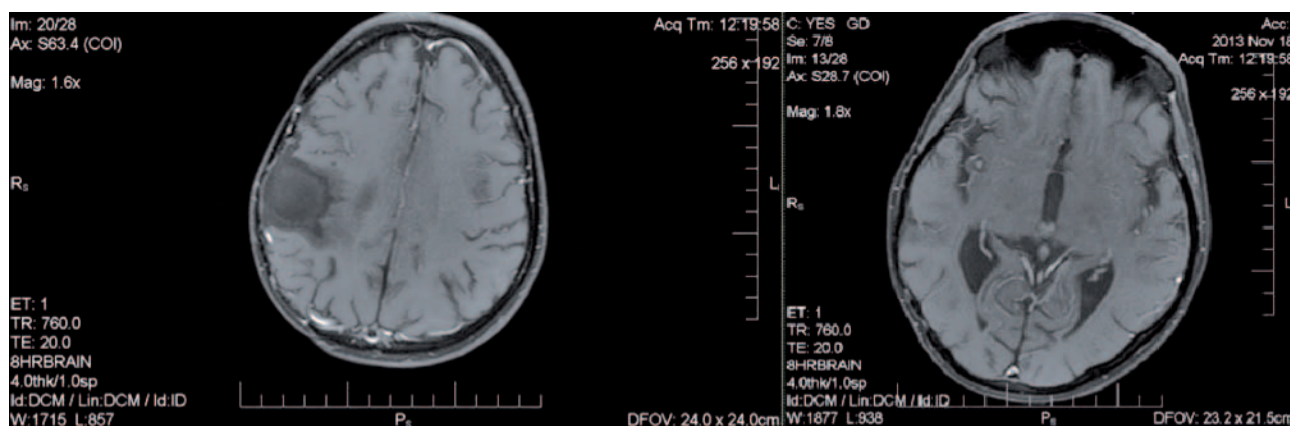


Figure 1. — MRI of recurrent neuroblastoma.

costeroid therapy (betamethasone) within 48 hours for fetal lung maturation and perilesional brain edema control.

Results

An emergency caesarean was performed under general anesthesia five days after admission, with no intraoperative or postoperative complications. A live female infant of 2,670 grams with a 9 Apgar score was delivered. Fetal lung maturity was achieved by administration of betamethasone. Post-section fetal recovery was uneventful. Postoperatively the mother had persistent, constant neurological symptoms. When discharged home, the patient was recommended ambulatory neurosurgical exam in order to establish the opportunity of surgery targeting the brain tumor.

Discussion

Ganglioneuroblastoma is a tumor of the sympathetic nervous system that arises from primitive sympathogonia and is composed of both mature gangliocytes and immature neuroblasts and has intermediate malignant potential [5]. These tumors are rare. They occur in fewer than five out of one million children each year [6]. Ganglioneuroblastomas are extremely rare in adults, with only about 50 cases documented in people over the age of 20, and only five cases observed in the adult brain [7]. According to the present authors' knowledge, there are no reports in the literature of ganglioneuroblastoma presenting during pregnancy [8].

Objectification of brain tumor by contrast MRI was necessary to establish the subsequent therapeutic management, although in literature there are not enough studies to determine the safe use of contrast in pregnancy [9]. MRI is probably the imaging diagnostic procedure of choice and should be performed when a brain tumor is suspected [10].

Before pregnancy the patient was declared cured, as there was no clinical nor radiological tumor relapse in

eight years. It is not well-established whether pregnancy-induced changes have any kind of tumorigenic effect, or if it is just a coincidence. There might be a relationship between pregnancy hormones and the rate of brain tumor growth mediated through specific intracellular receptors [11]. Pregnancy is an aggravating factor for brain tumors, on which it acts via three mechanisms: acceleration of tumor growth, increase of peritumoral edema, and the immunotolerance to foreign tissue antigens [12]. Normal physiological changes during the pregnancy, such as increased levels of gonadotropins and augmented fluid volume status may accelerate the growth of some types of brain tumors [13].

Intrauterine growth restriction (IUGR) and oligohydramnios is associated with a higher rate of pregnancy complications and increased fetal morbidity and mortality, and thus, delivery should be considered [14]. Treatment of brain tumor in pregnancy requires an integrated multidisciplinary approach, which includes neurosurgeons, ophthalmologists, radiologists, obstetricians, and neonatologists [15].

Indications about the mode of delivery are controversial. The optimal timing to recommend craniotomy and neurosurgical removal of the tumor will depend on the mother's neurological condition, the histological tumor type, as well as on the gestational age. In a study published in 2011, ten patients with brain tumors were diagnosed during pregnancy, prior to craniotomy, five patients had caesarean sections, two had vaginal deliveries, and in three patients, the delivery took place after the brain tumor was removed [16].

In the present case a caesarean section was performed under general anesthesia. General anesthesia is safe and dependable for operative delivery in pregnant women with intracranial tumor. Tracheal intubation allows maternal hyperventilation thereby controlling raised intracranial pressure. Hemodynamic stability is readily achieved to maintain cerebral perfusion [17].

Conclusion

It is not clear if tumor relapse was influenced by the metabolic and hormonal changes induced by pregnancy. The proper management of pregnant women with brain tumors requires an integrated multidisciplinary approach, in order to assess all maternal-fetal risks and benefits.

References

- [1] Robertson H.E.: "Das Ganglioneuroblastom ein besonderer Typus im System der Neurome". *Virchows Arch. [Pathol. Anat.]*, 1915, 63, 147.
- [2] Pavlidis N.A.: "Coexistence of pregnancy and malignancy". *The Oncologist*, 2002, 7, 279.
- [3] Armon C., Berman S.A.: "Neurologic disease and pregnancy". *Medscape reference*, 8 nov 2012. Available at: <http://emedicine.medscape.com/article/1149405-overview#aw2aab6b4>
- [4] Wu J., Ma Y.H., Wang T.L.: "Glioma in the third trimester of pregnancy: Two cases and a review of the literature". *Oncol. Lett.*, 2013, 5, 943.
- [5] Lonergan G.J., Schwab C.M., Suarez E.S., Carlson C.L.: "Neuroblastoma, ganglioneuroblastoma, and ganglioneuroma: radiologic-pathologic correlation". *Radiographics*, 2002, 22, 911.
- [6] Vorvick L.J., Chen Y.B.: "Ganglioneuroblastoma". *A.D.A.M. Medical Encyclopedia*, Feb 7, 2012. Available at: <http://www.ncbi.nlm.nih.gov/pubmedhealth/PMH0002408/>
- [7] Schipper M.H., van Duinen S.G., Taphoorn M.J., Kloet A., Walchenbach R., Wiggenraad R.G., Vecht C.J.: "Cerebral ganglioneuroblastoma of adult onset: two patients and a review of the literature". *Clin. Neurol. Neurosurg.*, 2012, 114, 529.
- [8] Chen B.F., Manjusha R., Al-Samarai S., Rajeswary J.: "First reported case of ganglioneuroblastoma in pregnancy and a review of the literature". *Obstet. Med.*, 2014, 7, 128
- [9] Black P., Morokoff A., Zauberman J., Claus E., Carroll R.: "Meningiomas: science and surgery". *Clin. Neurosurg.*, 2007, 54, 91.
- [10] Awada A., Watson T., Obeid T.: "Cavernous angioma presenting as pregnancy-related seizures". *Epilepsia*, 1997, 38, 844.
- [11] Isla A., Alvarez F., Gonzalez A., García-Grande A., Perez-Alvarez M., García-Blazquez M.: "Brain tumor and pregnancy". *Obstet. Gynecol.*, 1997, 89, 19.
- [12] Depret-Mosser S., Jomin M., Monnier J.C., Vinatier D., Bouthors-Ducloy A.S., Christiaens J.L., Krivosic-Horber R.: "Cerebral tumors and pregnancy. Apropos of 8 cases". *J. Gynecol. Obstet. Biol. Reprod.*, 1993, 22, 71.
- [13] Poisson M., Pertuiset B.F., Hauw J.J., Philippon J., Buge A., Moguilewsky M., et al.: "Steroid hormone receptors in human meningiomas, gliomas and brain metastases". *J. Neurooncol.*, 1983, 1, 179.
- [14] Golan A., Lin G., Evron S., Arieli S., Niv D., David M.P.: "Oligohydramnios: maternal complications and fetal outcome in 145 cases". *Gynecol. Obstet. Invest.*, 1994, 37, 91.
- [15] Khalil E. Rajab and Nouf Behzad N.: "Brain Tumor in Pregnancy". *Bahrain Medical Bulletin*, Mar 2013, 35. Available at: http://www.bahrainmedicalbulletin.com/march_2013/Brain-Tumour.pdf
- [16] Lynch J.C., Gouvêa F., Emmerich J.C., Kokinovrachos G., Pereira C., Welling L., Kislakov S.: "Management strategy for brain tumour diagnosed during pregnancy". *Br. J. Neurosurg.*, 2011, 25, 225.
- [17] Chang L., Looi-Lyons L., Bartosik L., Tindal S.: "Anesthesia for cesarean section in two patients with brain tumours". *Canadian Journal of Anesthesia*, 1999, 46, 61.

Address reprint requests to:
B. NICUSOR-FLORIN, M.D.
Faculty of Medicine
Nicolae Balcescu Str., Nr. 56,
500019 Brasov (Romania)
e-mail: nicosorbighiu@yahoo.com