BRAIN TUMORS AND PREGNANCY
Presentation of a case and a review of the literature

P. CHAUDHURI and H.C.S. WALLENBURG

Department of Obstetrics and Gynecology, Academic Hospital—Dijkzigt, Erasmus University, Rotterdam, The Netherlands

Accepted for publication 24 April 1980


A case of brain tumor complicating a full-term pregnancy is reported. The literature is reviewed to show the effect of pregnancy on these tumors, the method of diagnosis, and management. Pregnancy often unmasks the existence of an intracranial neoplasm. The diagnosis can easily be missed, as the symptoms such as headache, vomiting, visual disturbance etc. are often encountered in pregnancy with or without pre-eclampsia. A high index of suspicion on the part of the obstetrician is a key to timely diagnosis. Computerized axial tomography is extremely useful in confirming or refuting the diagnosis of brain tumor. Generally speaking, neurosurgical intervention is best deferred until after delivery. In most cases, pregnancy may be allowed to continue under close supervision until the baby is reasonably mature. Labor may be induced in suitable cases, and the baby should be delivered by elective forceps as soon as the second stage of labor is reached to cut down maternal bearing-down efforts.

brain tumors; astrocytoma; pregnancy

INTRODUCTION

Some 75% of cases of intracranial tumors occurring in women of reproductive age produce their first signs and symptoms during pregnancy (McClure Brown and Dixon, 1978). A considerable delay in making the right diagnosis can be caused by the fact that symptoms like vomiting may be accepted by both the patient and her doctor as one of the normal inconveniences of pregnancy, whereas other symptoms like headache or disturbed vision may be attributed to pre-eclampsia. Very little has been written about

Correspondence address: H.C.S. Wallenburg, M.D., Dept. of Obstetrics and Gynecology, Academic Hospital—Dijkzigt, Dr. Molwaterplein 40, 3015 GD Rotterdam, The Netherlands.
this problem of common interest to the neurosurgeon and obstetrician in the last 30 years since the extensive review of this condition by Rand and Adler (1950). However, significant progress has been made in obstetrics, neurology and neurosurgery in the last decade. The outlook of these cases is, therefore, not as uniformly bleak as it was in the past, provided that the disease is detected early in its course.

We report here a case of inoperable astrocytoma of the brain complicating a full-term pregnancy. A review of the literature is made to show the pitfalls of diagnosis in these cases and to outline the possible ways of management.

CASE HISTORY

A 25-yr-old, gravida-II, para-0 was admitted in the 41st wk of amenorrhea because of severe headache, vomiting and diplopia. She had been under the care of a local midwife and the course of pregnancy was uneventful until about 33 wk of amenorrhea, when she started complaining of occipital headache of increasing severity accompanied by sickness and occasional vomiting. At about 38 wk of pregnancy she developed a progressive diplopia. Obstetric examination by the midwife did not reveal any abnormalities: in particular, no hypertension, edema or proteinuria. Total weight gain during pregnancy was 14 kg. About 3 wk later she was referred to an ophthalmologist, who found bilateral papilledema, which he thought to be due to increased intracranial tension possibly due to a space-occupying lesion in the brain, and immediately referred her to our hospital. The gynecological history revealed a spontaneous abortion 6 yr ago and surgical removal of a right ovarian cyst 2 yr previously.

On admission we saw a caucasian woman of apparent good health. Her vital signs were normal. The blood pressure was 110/70 mm Hg. There was no edema or proteinuria. The uterus was of term size with the fetus in head presentation. The fetal heart rate was normal. The positive neurological signs included a paralysis of the right abducent nerve, left-sided hemiparesis and slight sensory loss on the left side. Laboratory results showed a blood group O, rhesus-positive, hemoglobin 7.7 mmol/l and no biochemical evidence of hepatic or renal disorder. A computerized axial tomography performed on the day of admission showed a large mass of varying density occupying the parietal region of the right cerebral hemisphere, with distortion of the right ventricle and displacement of the median structures. The neurologic signs and symptoms indicated the presence of an intracranial tumor leading to raised intracranial pressure.

The patient was given 10 mg dexamethasone i.v., followed by an oral dose of 4 mg every 6 h in an attempt to reduce cerebral edema. The patient was delivered on the day after admission by a lower-segment cesarian section of a healthy male infant weighing 3720 g. Computerized axial tomography was repeated, this time following an i.v. injection of an iodine dye, immediately after the operation. The mass took up the dye irregularly but there was a
tendency to ring formation. The differential diagnosis included a glioblastoma, a metastasis or, less likely, an abscess.

A right parieto-occipital trepanation was performed on the 3rd postpartum day. The dura appeared normal but the cortex was edematous and contained a large reddish-grey swelling which infiltrated diffusely and extensively into the parieto-occipital region of the right cerebral hemisphere. Since the tumor appeared to be inoperable, a biopsy was taken and internal decompression was performed. On histological examination the tumor was diagnosed to be an anaplastic astrocytoma protoplasmaticum. The postoperative course and the puerperium were uneventful. 3 wk after the operation all neurologic signs and symptoms had disappeared and she was discharged with her baby, both in good condition. She was subsequently treated by radiotherapy. When seen 6 wk after delivery, she had no complaints and the baby was doing well. No abnormality was detected on clinical examination. The suggestion of sterilization was turned down by the patient. She was given an injection of Depo-provera and was advised to reconsider sterilization. At the time of writing, a year after the tumor was discovered, the patient was still under the care of the radiotherapist and in good condition.

DISCUSSION

The case presented here confirms the known fact that a brain tumor in women of reproductive age may declare itself for the first time during pregnancy. The angiomata, neurofibromata and supra- and para-sellar meningioma are notable in this respect (Bickerstaff et al., 1958). This is believed to be due to an increase in the size of the tumor consequent to a state of positive water balance as a result of the altered hormonal environment which accompanies pregnancy (Weyland et al., 1951). King (1950) postulated that in certain tumors of the brain this increase in tumor size is due to engorgement of the blood vessels feeding the tumor. An occurrence of pregnancy in these cases heightens the problem of diagnosis, since many signs and symptoms of brain tumor such as headache, vomiting and visual disturbance are also encountered in pregnancy with or without pre-eclampsia. Convulsions as a result of increased intracranial pressure caused by a brain tumor (Barber and Graber, 1974) may mistakenly be interpreted as being due to eclampsia. Although lateralizing signs such as hemiparesis and hemisensory deficits are usually not encountered in pre-eclampsia (Carmel, 1974), a syndrome of temporal lobe herniation with pupillary dilatation apparently due to pre-eclampsia has been reported by Kornblith et al. (1969). There is a host of evidence in the literature that this confusing complexity of the problem can considerably delay the diagnosis of a brain tumor during pregnancy (Cushing, 1917; Hagedoorn, 1937; O'Connell, 1962). A high index of clinical suspicion and a thorough neurologic examination is necessary to bring cases of brain tumor to light. When the tumor is situated in an area of functional concentration, a slight increase in size will produce a disproportionate clinical effect. The presenting neurologic features may also help to indicate the
nature of the tumor. A paralysis of the sixth cranial nerve is common in astrocytoma (Houston-Merrit, 1973). This was also present in our case. A pregnant woman may be suspected of harboring a brain tumor in a case of epileptic insult arising for the first time during pregnancy (Barnes, 1974), intractable vomiting, persistent and progressive headache and visual disturbance. An ophthalmoscopic examination should immediately be performed and the opinion of a neurologist should be sought.

Modern diagnostic modalities in neurology have significantly improved the accuracy of diagnosis in such cases. Electroencephalography, angiography, echo-encephalography and computerized axial tomography are outstanding in this respect. The latter alone may be sufficient in many situations, as seen in our case. A normal sella turcica on X-ray does not necessarily exclude the presence of an intracranial tumor (Cushing and Eisenhardt, 1929; Bardram and Møller, 1952). Controversy exists with regard to the use of brain-scanning with radioactive isotopes during pregnancy because of the risk of the fetus being exposed to radioactivity. Sternberg (1970) points out that substances to which the placenta is impermeable such as Hg203 or Hg197—chloromerodrin can safely be used in pregnancy. He also suggested the use of colloidal gold or technetium sulfide, as these particles are engulfed by maternal reticuloendothelial system and a very small fraction is taken up by the placenta.

Once the diagnosis is established, the line of treatment must be decided in a conjoint team composed of neurosurgeon, obstetrician and pediatrician.

Could neurosurgical intervention be carried out in pregnancy? Falconer and Stafford-Bell (1975) reported cases in which neurosurgical intervention had been successfully carried out without any deleterious effect on the mother or the baby. Other authors appear to be reluctant to do neurosurgery during pregnancy, because increased vascularity, hypotension and hypothermia normal during such procedures constitute a hazard both to the mother and the fetus (Kempers and Miller, 1963).

The next question is: should pregnancy be terminated? The decision depends, among other factors, upon the nature and the site of the tumor. Rand and Adler (1950) reported 3 patients with astrocytoma who died with their babies in utero. These authors recommend prompt surgical intervention in patients suspected of harboring a glioma. Carmel (1974) maintains that pregnancy may be allowed to continue in cases of benign supratentorial tumors without evidence of increased intracranial pressure. We had no difficulty in deciding to terminate pregnancy in our case, as the patient was already past term. If pregnancy is allowed to continue, the patient must be under close supervision, and seizures, should they occur, can be controlled by phenobarbitone or phenytoin drugs. Since these drugs may cause coagulation defects in the neonate, prophylactic administration of vitamin K1 to the mother in the month before and during delivery has been recommended (Mountain et al., 1971). Determination of the lecithin/sphingomyelin ratio at a later stage of pregnancy to predict fetal lung maturity may be helpful in deciding on the best time of delivery.
There is no unanimity of opinion in the literature on the mode of delivery in such cases. Previous workers (Rand and Adler, 1950) believed that the strain of labor would cause an increase in intracranial pressure. Consequently, they advised cesarian section in all cases. More recently, Marx et al. (1961) have shown that uterine contractions alone do not increase cerebrospinal fluid pressure, but that this certainly occurs during the second stage of labor, due to maternal bearing-down efforts. This fact has encouraged contemporary obstetricians (Kempers and Miller, 1963) to induce labor by amniotomy and oxytocin infusion in cases with a favorable cervix, the second stage being terminated by prophylactic forceps under pudendal block. We did a cesarean section in our case, as the cervix was unripe and the patient's complaints together with the results of the neurologic investigations warranted immediate neurosurgical intervention.

In conclusion, the concurrence of a brain tumor and pregnancy constitutes a perplexing problem. As pregnancy unmasks a majority of cases of brain tumor in women of reproductive age, the obstetrician gets a patient population from which many cases of brain tumor may be picked up. This necessitates awareness of the problem and thoroughness of clinical examination. Treatment has to be individualized depending on the patient's signs and symptoms, the site and the nature of the tumor, and the duration of pregnancy.

REFERENCES


