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SHORT COMMUNICATION

Three Cases of Brain Tumor in Pregnancy

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Abstract

Background: Brain tumours in pregnancy are a pathology that carries risk to both maternal and fetal health. It is considered a case of interest in the point of surgical management. **Objective**: The literature reviewed to show the effect of pregnancy on these tumours, the diagnosis and management. **Methods**: 3 cases were reported to the institution which was managed with the multidisciplinary approach which has been mentioned. **Conclusions**: The presence of a brain tumour associated with pregnancies implies a high risk of maternal and perinatal morbidity and mortality requiring multidisciplinary management and a treatment team with surgical experience

Keywords: Meningioma, pregnancy, glioma

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Introduction

Pregnancy alone causes significant physiological changes in women. The existence of an intracranial tumour during pregnancy can lead to major consequences, such as increased maternal mortality [1]. Managing a central nervous system (CNS) tumour during pregnancy involves numerous problems. According to population-based studies, brain tumours are linked to an increased risk of maternal mortality, preterm birth, intrauterine growth restriction (IUGR), and cesarean delivery [2]. The incidence of brain tumours in pregnant women is believed to be 1 in 1000-2000 pregnancies, and it is comparable between pregnant and non-pregnant women. Malignant brain tumours occur in 3.6 out of every 1 million live births [3]. According to the literature, the most common primary tumours include gliomas, meningiomas, pituitary adenoma, and metastases from breast carcinomas [4]. Pregnant women are at higher risk of developing brain tumours due to changes in their anatomy and physiology. Cerebellar granular cells have been reported to have an effect when their estrogen receptors are stimulated. In predisposed women, the emergence and growth of tumors may therefore be influenced by the correlation with the elevated levels of this hormone noted during pregnancy. The presence of tumor cellular receptors, including estrogen and progesterone receptors, EGFR, FGF 2, PDGFR B, and VEGF, has been directly associated with increased levels of hormones and growth factors and the progression of intracranial tumours [5]. Pregnancy causes an increase in the volume of maternal blood, which may contribute to edema surrounding the tumor and enhance regional cerebral blood flow. Headache, nausea, vomiting, neurologic symptoms, and seizures are examples of symptoms of elevated intracranial pressure that may mimic early pregnancy symptoms or pregnancy-related hypertension disorders like eclampsia or pre-eclampsia. Based on existing research, brain tumour-induced repetitive seizures affect 27–41% of expectant mothers. The mass effect is the primary cause of brain tumour symptoms [6,7]. Seizures and other neurologic symptoms may worsen during pregnancy in people who already have gliomas, and these symptoms may cause obstetric crises. Elevated vascularity of tumours like gliomas because of hormonal fluctuations may be connected to an increase in intracranial tension (ICT). Acoustic schwannomas, meningiomas, gliomas, and brain metastases from breast cancer are examples of hormonally driven tumours that may grow more quickly during pregnancy due to changes in hormone levels [8].

Case 1

A 24-year-old female patient presented with a history of headaches for 4 months which was maximum during the morning hours, associated with vomiting, imbalance, and blurring of vision. There was no history of trauma, loss of consciousness, convulsion or limb weakness. She was hypothyroid, hypertensive, and had arthritis. She was in the 30^{th} week of gestation. On clinical examination, vitals were stable with GCS (Glasgow Coma Score) of 15 (E4V5M6), pupils were equal and reacting to light, visual acuity was diminished in both eyes with the presence of double vision, and

gaze evoked nystagmus on lateral gazes. Motor system examination revealed normal power in all 4 limbs, with a normal sensory system. The right plantar was extensor and left equivocal with reduced tone. Knee jerks were pendular. She was unable to walk without support. Romberg's sign was positive, with eyes open, where she was swaying to both sides. Ultrasonography revealed a live fetus of 30 weeks. She was planned for expectant management till more fetal maturity. MRI brain (Figure 1) showed T1 hypointense lesion, T2 flair iso to hyperintense to grey matter and DWI showed diffusion restriction in a large posterior fossa mass, associated with hydrocephalus. She underwent an emergency VP shunt initially for obstructive hydrocephalus and later went for an elective posterior fossa craniotomy and excision of the infratentorial tumor with duroplasty, followed by a Lower Segment Caesarian Section (LSCS) to deliver the healthy but premature baby (32 weeks) in the same sitting. She had a good recovery, with a modified Rankin scale of 2. Histopathological examination (HPE) of the tumour was suggestive of medulloblastoma and IHC (Immuno-Histo-Chemistry) showed synaptophysin patchily positive, Ki67- 60%, ATRX- Positive, P53- wild type, beta catenin- membranous and cytoplasmic positive, CD45, GFAP, S100 – negative, all of which confirmed it to be an Anaplastic Medulloblastoma. She was advised Chemotherapy and Radiotherapy.

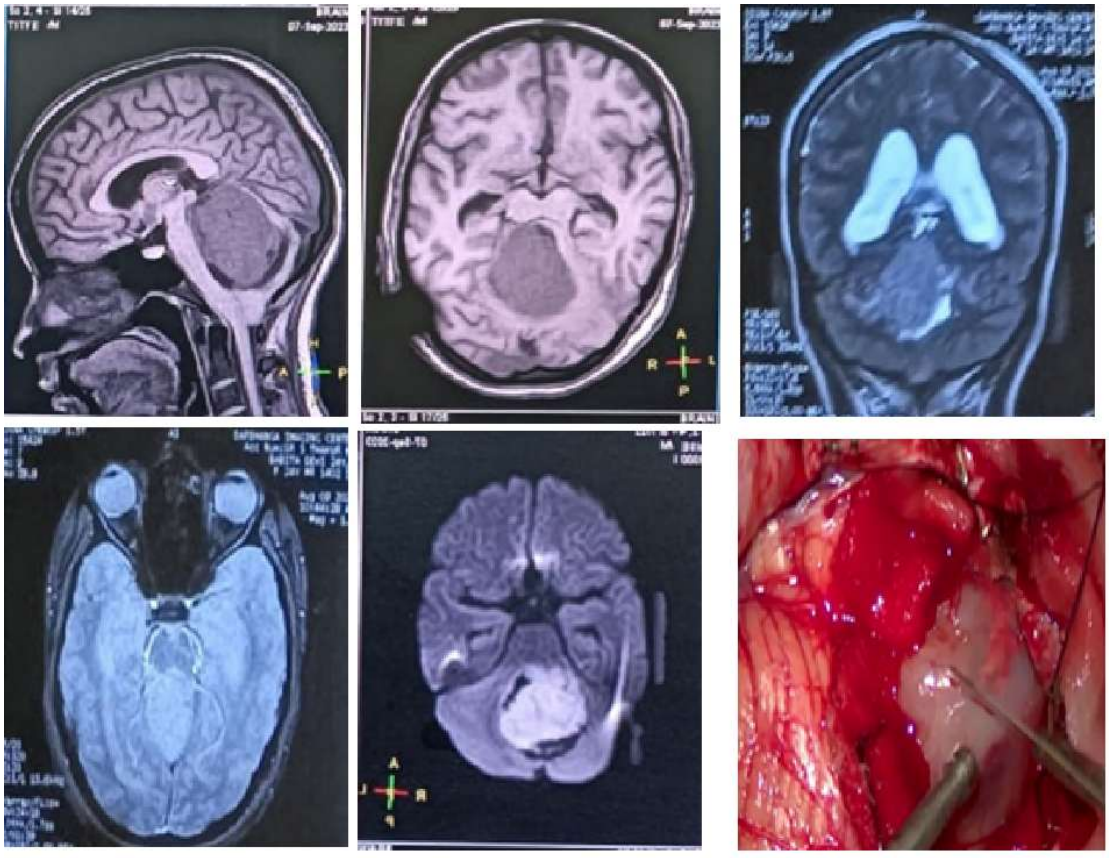

Figure 1- MRI images Showing medulloblastoma and Intra-op images

Case 2

A 35years old female patient presented with headache and blurring of vision in the left eye for 15 days. On examination, she had mild dysphasia, and had a right-sided pronator drift. Abdominal examination revealed a live fetus of 36 weeks of gestation. MRI brain showed (Figure 2) large solid T1 hypointense and T2 hyperintense extra-axial lesion in the left temporal region, most likely a meningioma, originating from the greater wing of the sphenoid causing compression on the left lateral ventricle causing significant mass effect. She underwent elective LSCS and a left craniotomy for the tumour in the same sitting. Histopathological Examination was suggestive of chordoid meningioma. On IHC, GFAP was positive, EMA stain showed diffuse membranous staining in tumour cells, PR receptor showed diffuse strong nuclear straining, P53 was the wild type, Ki67 of 12% all of which were suggestive of an Atypical meningioma (Gr 2, WHO). She is under regular follow-up with MRI surveillance. A 3-month contrast MRI didn't show any residual or recurrent tumour.

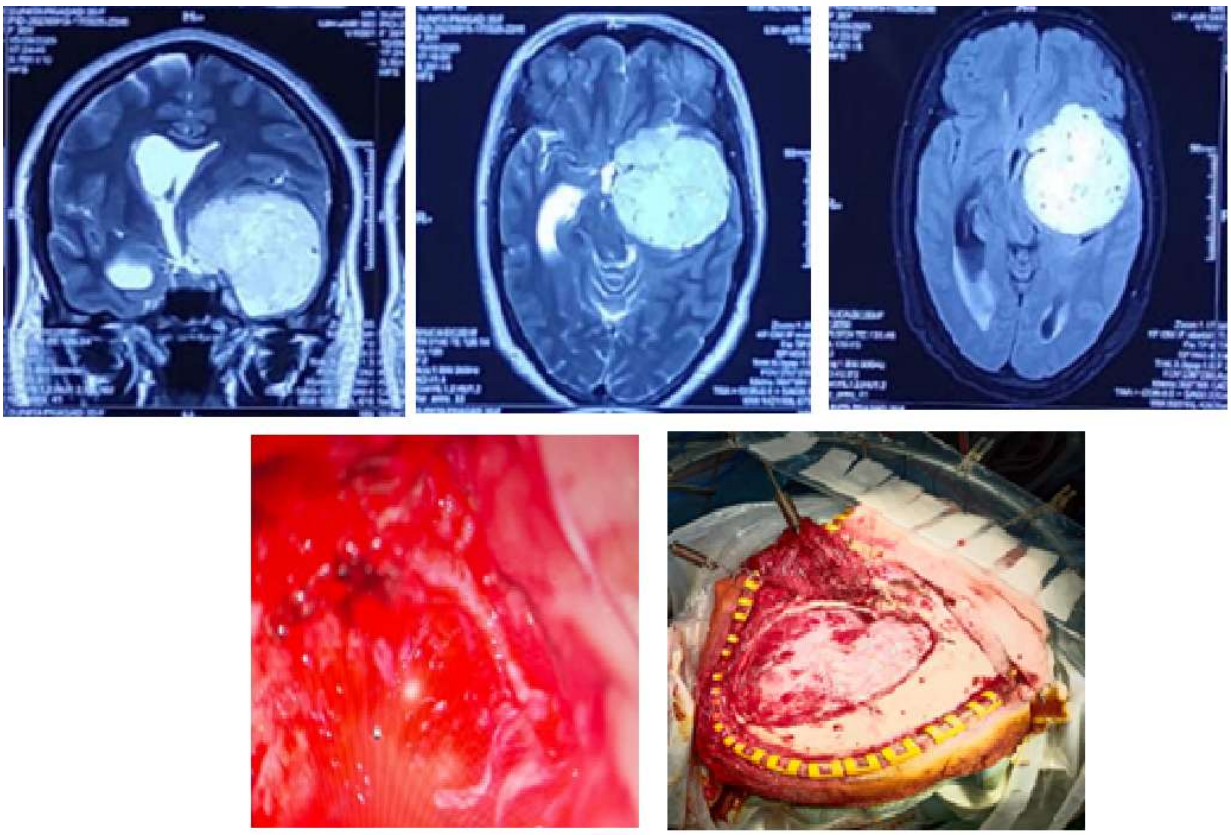

Figure 2. MRI Shows Meningioma originating from the greater wing of the sphenoid (above) and intraop images(below)

Case 3

A 34-year-old female presented with visual disturbances in both eyes for 1 month associated with headache and giddiness for the same duration. She was 6 months pregnant. On further evaluation, her vital parameters were in the normal range. She was blind in the left eye, and in the right, only perception of light was present. On Fundoscopy, bilateral papilloedema was present with secondary optic atrophy. MRI Brain (Figure 3) showed a T2 hyperintense intra-axial lesion in the left parietal-occipital-temporal region compressing over the left lateral ventricle, suggestive of a low-grade glioma. She underwent neuro-navigation-guided craniotomy and excision of the brain tumour, which was uneventful. HPE of the tumour showed a Diffuse Glioma (WHO grade 2) - NOS and was advised IHC IDH Mutant, CDKN2A/B Retention. The fetal monitoring was done during the tumour surgery and later LSCS was performed at 36 weeks

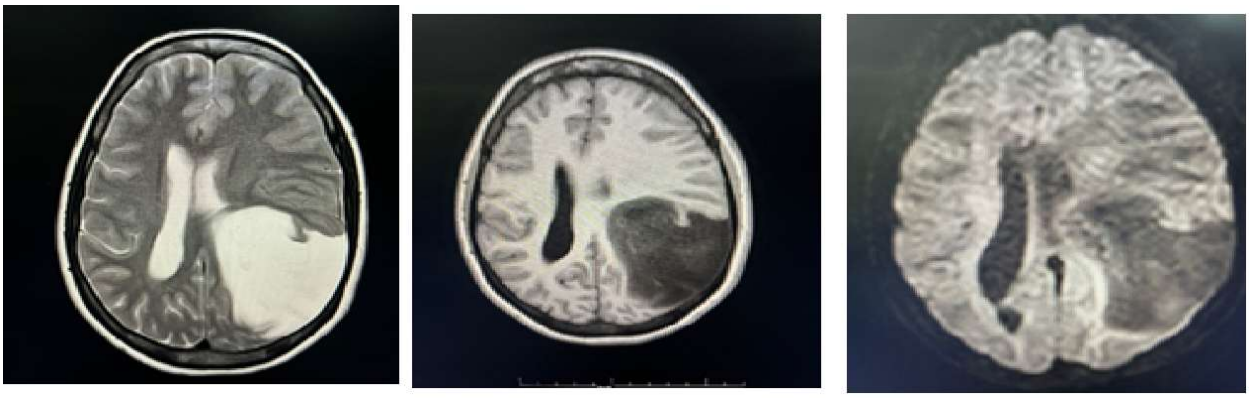

Figure 3. MRI Images showing Diffuse Low-Grade glioma over left parieto-temporal region.

Discussion

The biggest challenge regarding the treatment of brain tumours diagnosed during pregnancy is the timing of surgery. In our study, in 2 patients the fetus was delivered at the same sitting with the excision of the tumour and in one patient the tumour was excised with postoperative fetal monitoring to allow further fetal maturity. Caesarean section was preferred in all patients to avoid increased intracranial pressure from vaginal delivery and difficulty of vaginal delivery due to the immaturity of the cervix in preterm labour.

Medulloblastoma is a malignant brain tumor (WHO grade IV) formed by stem cells in the cerebellum's sub-ependymal matrix or external granular layer [9]. The care of medulloblastoma during pregnancy is a difficult decision since the mother's and fetus's well-being must be balanced against the hazards of treatment. An early delivery should be considered because the outcome may not be positive. A tumor that causes brainstem compression is an emergency. Any delay may imperil both the mother's and the fetus' lives [10].

Meningiomas are believed to account for between 13% and 26% of all cerebral

tumors [11]. The abundant expression of progesterone receptor (PR) in meningiomas is well recognized. The evidence that several meningiomas enlarge and become symptomatic in pregnancy and reduce in size after delivery suggests an important role of the hormone [12]. In a study of 17 gestational meningiomas, Lusis et al. found that hemodynamic changes during pregnancy, increased blood volume, and vascularization all contributed to the tumors' rapid growth. In contrast to other types of meningiomas, gestational meningiomas exhibit intra- and extracellular oedema, as well as typical foamy, swollen cells. Pregnancy is characterized by significant hormonal swings, which may result in growth or symptom exacerbations. Therefore, it is possible that an undiagnosed meningioma was already present prior to pregnancy, causing a rise in its size [13].

Diffuse low-grade gliomas (LGGs) are intra-axial, World Health Organization grade II neoplasms that account for approximately 7% of adults' primary central nervous system tumours [14]. Yust-Katz et al [15] summarized MD Anderson's experience with gliomas of different grades in pregnancy and observed that among women who became pregnant after glioma diagnosis and harboured grade II&III tumours, 44% had confirmed tumour progression during pregnancy or within 8 weeks of delivery.

Conclusion

The symptoms of co-existing brain tumours are usually masked by the symptoms of pregnancy. There may be a relationship between pregnancy hormones and the rate of brain tumour growth mediated through specific intracellular receptors. Finally, when considering treatment modalities and timing of surgery for the tumour, each patient should be managed through a multidisciplinary approach based on a personalized treatment algorithm.

Statements and Declarations

Conflicts of interest

The authors declare that they do not have conflict of interest.

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