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Case Report

Hook effect: a case study of a giant invasive prolactinoma in pregnancy with falsely low serum prolactin

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ABSTRACT

Prolactinoma is the most common type of pituitary adenoma characterized by excessive production of the hormone prolactin, while the majority of tumours are benign. A small percentage can develop into more aggressive macro adenocarcinomas, which pose a significant challenge in management and prognosis. High estrogen levels during pregnancy lead to an increase in the size of prolactinomas leading to compression of optic chiasma. Eventually, it manifests as visual symptoms and headaches. Pharmacotherapy with dopamine agonists is the treatment of choice and multidisciplinary management results in successful outcomes. The present study describes A 28-year-old female with a 36-week pregnancy presenting with complaints of neck pain, headache, and blurring of vision to our hospital. On inquiry, the patient gave a history of galactorrhoea so a magnetic resonance imaging (MRI) brain was done. MRI brain was suggestive of a giant 18×9×8 mm macroadenoma.

Keywords: Prolactinoma, Pituitary adenoma, Prolactin, Optic chiasma, Galactorrhoea, Macroadenoma

INTRODUCTION

Prolactinomas are benign tumours known as prolactin secreting adenomas (PSA). This tumour is more common in females of childbearing age and has an incidence of 3-5 per 1,00,000 females and this value varies depending on region to region. Prolactin hormone is responsible for lactation.[1-3] Diagnosing hyperprolactinemia relies on measuring prolactin hormone levels in the blood. Among women, common symptoms of having a prolactinoma include changes in menstruation such as irregular periods or no periods, infertility, milky discharge from the breasts, also called galactorrhoea, loss of interest in sex, pain or discomfort during sex due to vaginal dryness. Elevated serum level of prolactin with amenorrhoea and galactorrhoea is typically indicative of prolactinoma. Among men, common symptoms include loss of interest in sex associated with low levels of testosterone and erectile dysfunction.

The Hooks effect, a phenomenon where extremely high prolactin levels can paradoxically result in falsely low readings in some assays.[4-6] Should be considered when interpreting laboratory results, especially in pregnancy where prolactin levels are naturally elevated. This effect occurs when a very high amount of circulating serum prolactin causes antibody saturation in the immunoradiometric assay.[7] And chemiluminescent assay preventing the binding of the two in a sandwich, leading to artifactually low results. The result is an apparent prolactin concentration that is only modestly elevated suggesting that macroadenoma is clinically not functioning. This artifact can be avoided by repeating the assay using a 1:100 dilution of serum to confirm the diagnosis of hyperprolactinemia.[3,8]

CASE REPORT

A 28-year-old female G3P1L1A1 with 36 weeks of gestation came to our hospital with complaints of

headache, neck pain, and breathlessness She was taking bromocriptine for increased prolactin level before conception as advised by a local practitioner without doing magnetic resonance imaging (MRI) brain. Which she stopped after conception on her own. After 8 months of gestation, she developed headache, neck pain, and blurring of vision for which she was referred to our hospital for multidisciplinary care. On arrival patient vital was within normal limit. On enquiry patient gave a history of galactorrhoea so an MRI brain was done suggestive of an 18×9×8 mm sized well defined single intensity lesion seen in the pituitary fossa, displacing the optic chiasma superiorly and causing effacement of the suprasellar cistern.

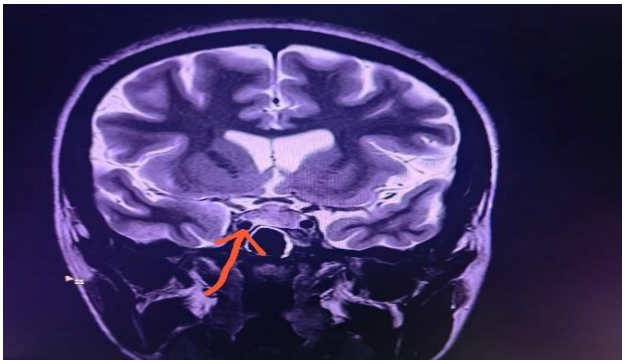

Figure 1: Pituitary adenoma.

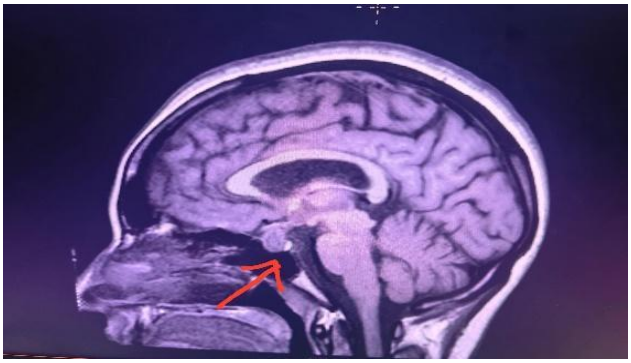

Figure 2: Pituitary macroadenoma.

Ophthalmologist opinion was taken for visual impairment, which was not suggestive of visual field defect. And a serum prolactin level was done which was 27.87 ng/dl. She had persistent headaches even after analgesics. Generally, in macro adenomas prolactin level is more than 200 ng/dl, but in our case, prolactin did not increase. We took the endocrinologist's opinion and he advised serum prolactin level by 1:100 dilution method and now its value was 224.76 ng/dl which indicated the diagnosis of prolactinoma. Tab cabergoline 0.25 mg was started for her once a week. And after the first dose, only her headache symptoms were improving. After 1 month she was delivered a healthy female child. After one week of delivery MRI brain with contrast was done which shows normal size of pituitary gland. Patient improves symptomatically, also serum prolactin level comes within normal range. After that patient was given discharge on 10th day. On follow up, after one-month serum prolactin level was done which was 87.6 ng /dl which is normal level of prolactin in lactation. On eye examination no visual field defect was found. After 6 months MRI brain was done which shows normal shape and size of pituitary gland.

DISCUSSION

A prolactinoma is a benign tumor that develops in the pituitary gland, a small endocrine gland located at the base of the brain. The tumor primarily secretes prolactin, a hormone that plays a vital role in lactation and reproductive functions. However, excessive prolactin production can lead to a variety of symptoms, including menstrual irregularities, infertility, and galactorrhoea (milk production in non-lactating individuals). Prolactin plays a crucial role in lactation and is essential for normal reproductive function in both men and women. During pregnancy and breastfeeding, prolactin levels rise significantly to stimulate milk production in the mammary glands. Prolactin also has immunomodulatory effects and may contribute to the body's immune response. High estrogen levels during pregnancy lead to an increase in the size of prolactinomas leading to compression of optic chiasma.[8]

The patient was treated with cabergoline, a dopamine agonist that effectively reduced prolactin levels and relieved her symptoms. Cabergoline has higher efficacy in normalizing prolactin levels and reducing the size of prolactinoma.[8-10] If pharmacotherapy is not very effective or there is deterioration of symptoms is an indication for transsphenoidal debulking surgery it can be planned in the 2nd trimester if needed or after delivery if pregnancy is approaching term. Bromocriptine is started before conception if a female wanted to conceive. After conception, dopamine agonists should be discontinued, and close monitoring of tumour size during pregnancy is a must.[11,12]

CONCLUSION

Managing prolactinoma during pregnancy presents unique challenges, requiring a careful balance between maternal health and fatal safety. The Hooks effect adds a layer of complexity to the diagnostic process, emphasizing the need for experienced interpretation of prolactin levels. While prolactinoma can impact fertility and pregnancy, with proper management and monitoring, most women with this condition can have successful pregnancies. The key lies in preconception planning, early diagnosis, and a tailored approach to treatment throughout gestation. As research in this field continues to evolve, management strategies may be refined, potentially improving outcomes for affected individuals. Ultimately, a collaborative approach involving patients, endocrinologists, obstetricians, and other specialists is crucial for navigating the complexities of prolactinoma in pregnancy and

ensuring the best possible care for both mother and child. We can prevent complications of prolactinoma on regular follow up of patient every six monthly and regular checking of serum prolactin levels and MRI brain.

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