

Case Report

Pituitary gland metastasis from breast cancer: case report

Mohamed Almadhoni¹ and Mohamed Ali Baggas^{2*}

¹Mediterranean Clinic, Tripoli, Libya

²Department of Surgery, University of Tripoli, Libya

Introduction

Cancer metastasis to the pituitary gland is rare, but in most cases, it originates from a late-stage breast tumor or lung cancer. The most common symptoms of metastasis to the pituitary gland are diabetes insipidus and visual disturbance. The common site of metastasis is the posterior portion of the pituitary gland because it is highly vascularized. Metastases to this site represent 1% of all tumors [1]. Metastasis to the pituitary gland is difficult to diagnose by hormonal analysis and magnetic resonance imaging of the brain and requires biopsy for confirmation [2].

The recent increase in survival of cancer patients and the advancement in diagnostic techniques have resulted in a more frequent diagnosis of breast and lung cancer metastasis to the pituitary gland, which has a poor prognosis [3,4].

Case report

A 43-years old woman with right breast carcinoma since 2015 and with lymph node and bone metastases that developed after treatment with chemotherapy, hormones, radiotherapy, and surgical ablation of the ovaries presented at the Tripoli University Hospital in February 2017. She presented with a history of repeated attacks of vomiting for two months and a history of generalized fatigability and postural dizziness that worsened in the preceding two weeks, as well as marked weight and appetite loss, and diminution of vision. On examination, her blood pressure was 90/60 mmHg, and her pulse rate was 62 bpm. There was no lymphadenopathy or organomegaly. Initially, a pituitary macroadenoma was suspected because of visual disturbances.

Laboratory investigations

The patient’s laboratory results on admission revealed electrolyte disturbances in the form of hypernatremia and hypokalemia with low pituitary hormones and high tumor markers and LDH. Her urine output was exceeding 4 liters/24h (Tables 1,2). She was managed with intravenous fluids, hydrocortisone, and antibiotics, and the following workup was carried out.

More Information

***Address for Correspondence:**

Mohamed Ali Baggas, Department of Surgery, University of Tripoli, Libya, Email: baggasmoh@gmail.com; m.baggas@uot.edu.ly

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In an ultrasound of the abdomen, the liver appeared normal and no focal lesion or sharp edge was observed. Gall bladder, common bile duct, and intrahepatic ducts were

Table 1: Laboratory data of the patient.

Analyte	Value	Normal range
General hematology and serum chemistry		
Leukocytes (10 ⁹ /L.)	4.7	
Hemoglobin (g/dl)	9.9	
Platelets (10 ⁹ /L.)	173	
Random blood sugar (mg/dl)	91	
Urea (mg/dl)	16	
Creatinine (mg/dl)	0.8	
Na ⁺ (mg/dl)	148	
K ⁺ (mg/dl)	3.2	
Cl ⁻ (mg/dl)	108	
Total bilirubin (mg/dl)	0.35	
LDH (U/l)	1706	
ALP (U/l)	505	
AST (U/l)	81	
ALT (U/l)	32	
Serum magnesium (mg/dl)	3.1	
Basal cortisone (nmol/l)	17.4	171-536
Pituitary hormones		
Prolactin (ng/ml)	0.441	4.79-23.3
TSH (mIU/L)	0.012	0.27-4.20
T4 (nmol/l)	66.3	66.0-81.0
T3 (nmol/l)	1.73	1.3-3.1
FSH (IU/L)	< 1.0	4.5-21.5
LH (IU/L)	< 1.0	5-25
Tumor markers		
CA 15-3 (U/ml)	1079.9	< 30
CA 125 (U/ml)	89.9	< 46

Table 2: Post-operative laboratory data 10 days after admission.

Erythrocytes x10 ⁹ /µl	10.6	16.9	15.8	12.7	8.9	7.5	10.2	7.1	10.8	5.2
Hemoglobin (g/dl)	8.1	12.5	10.7	11.6	12	12.4	12.2	11.5	10.2	9.5
Platelets (10 ⁹ /L)	227	206	180	201	173	173	182	155	191	212
Na ⁺ (mg/dl)	146	153	156	169	166	164	152	158	156	155
K ⁺ (mg/dl)	3.3	3.3	2.3	3.4	3	3.4	3.8	4.5	3.8	4.2
Cl ⁻ (mg/dl)	117	123	128	136	133	132	129	128	122	120
Blood sugar profile (mg/dl)	149	96	114	110	146	129	150	148	174	111
Creatinine (mg/dl)	2.1	2.2	2.9	2.4	1.9	0.2	1.6	1.3	1.1	1.4
Urea (mg/dl)	26	28	37	54	71	77	81	77	73	75
Input (ml)	3800	3850	4800	1900	4950	3750	1910	3550	3950	3200
Output (ml)	3700	3000	3800	2500	4130	2200	2600	4000	3100	3050

normal. Spleen, pancreas, and both kidneys were also normal, and no ascites or para-aortic lymphadenopathy was detected.

In computerized scanning (Siemens Somatom Emotion 16 CT Scanner), the chest, abdomen pelvis, lungs, liver, gall bladder, spleen, pancreas, kidneys, adrenals, and urinary bladder were normal. Multiple bone lesions were present at the dorsolumbar spine and pelvis, and enlarged axillary lymphadenopathy was suggestive of metastasis.

CT of the brain showed a small contrast-enhanced suprasellar lesion requiring magnetic resonance imaging (MRI) for evaluation of the pituitary. MRI of the brain and pituitary gland revealed an enlarged pituitary gland with a small infundibular enhanced mass (8 x 8 mm) to be followed up and the results correlated with laboratory findings.

The patient was diagnosed as having pituitary adenoma with panhypopituitarism and discharged on hydrocortisone tablets (30 mg in the morning and 20 mg in the evening), as well as one 50 mg tablet of L-thyroxine daily.

She was followed up in the endocrinology and oncology outpatient departments. Over the subsequent months, the patient progressively deteriorated. By the second of January 2018, she developed bilateral loss of vision and frequent attacks of hypotension and hypoglycemia.

MRI of the brain and pituitary gland showed increased contrast enhancement of the sellar and suprasellar mass (28 x 18 mm) with compression and displacement of the optic chiasma and tract reaching to the floor of the third ventricle and encasing the cavernous sinus on both sides. There was no evidence of intrasellar hemorrhage (Figure 1).

Surgery

The patient was admitted to the intensive care unit, and intravenous saline and dexamethasone were started. On the third of January 2018, the patient underwent pterional craniotomy and decompression, and a biopsy was taken. The pituitary tumor was resected by trans-cranial surgery. Post-operatively, the patient was kept in the intensive care unit for close observation. On the second day, the vision and consciousness levels improved. The patient was monitored closely for diabetes insipidus symptoms and managed with intravenous dexamethasone, low-strength saline, antibiotics, and routine postoperative care. Transient diabetes insipidus

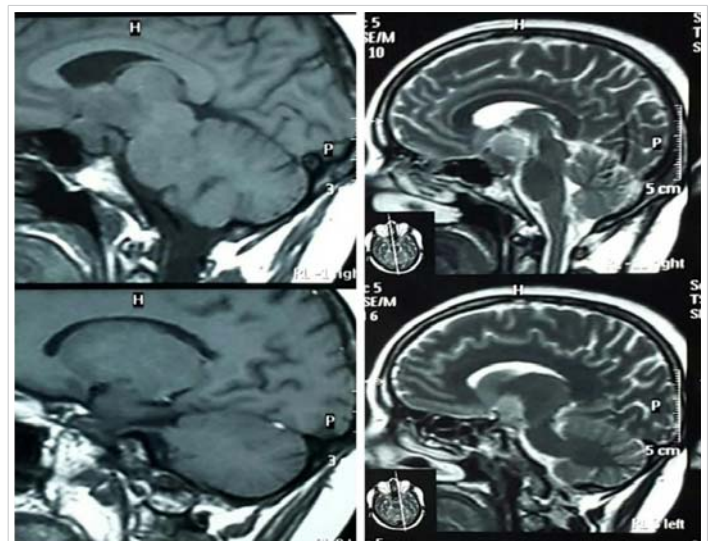


Figure 1: MRI. T1 T2 sequences with contrast, 3.5 mm thickness showed evidence of large well defined sellar and suprasellar mass lesion 18 mm by 28 mm, homogenously enhanced post IV contrast injection causing compression on optic chiasma reaching to 3rd ventricle floor and encasing cavernous sinus on both side.

occurred but resolved without desmopressin. A follow-up CT scan of the brain showed a small subarachnoid hemorrhage. Brain MRI demonstrated gross total resection of the tumor.

Histopathological examination of the resected mass showed a poorly differentiated adenocarcinoma with signet ring features compatible with metastasis.

Outcomes

Postoperative follow-up continued for two weeks, and subsequent clinical imaging did not show local recurrence of the primary malignancy. She was started on desmopressin nasal spray and steroids. Her blood sugar level improved, with no more attacks of hypoglycemia, and her urine output stabilized at 3 liters. She continued to be followed up by an endocrinologist and an oncologist.

Discussion

Mass lesions that can cause hypopituitarism include pituitary adenomas, cysts, lymphocytic hypophysitis, and metastatic cancer. Most reported cases of metastasis to the pituitary show that the primary tumor was in the breast or lung. Moreover, diabetes insipidus occurs in about 70% of the cases, and hypopituitarism occurs in 15% of symptomatic cases [5], It's known that the Blood-Brain Barrier has an



important role in brain metastasis formation, it forms a tight barrier protecting the central nervous system from cancer cells entrance, but the absence of the blood-brain barrier in the posterior pituitary region increase the chance of metastatic cells spread that may travel through the hypothalamus-hypophyseal portal circulation system, The most route for metastasis in posterior pituitary lobe by hematogenous spread through the inferior hypophyseal artery [6].

Any mass lesion in the sella can cause temporary or permanent damage by exerting pressure on pituitary cells. Symptoms occur in about 7% of patients with pituitary metastasis and commonly diabetes insipidus, occurring in about 50% – 70% of patients. The most common clinical symptoms are headache, fatigue, polyuria, visual loss [7,8], anterior pituitary dysfunction, visual field defects, retro-orbital pain, and ophthalmoplegia. The prognosis is poor and survival in one series averaged three to six months [9].

Patients may experience nausea, vomiting, fatigue, and weight loss. Therefore, it is not surprising that pan-hypopituitarism can be easily attributed to the side effects of chemotherapy received for the primary malignancy [10].

Pan-hypopituitarism and pituitary metastasis are likely underdiagnosed. However, when diabetes insipidus results in polyuria and polydipsia becomes generally a frank, the symptom makes the patient seek medical advice. Diagnosis of pituitary metastasis is difficult because up to 16% of such patients with overt malignancy may also have pituitary adenoma [11].

Because the clinical and radiological manifestations of malignant metastasis to the pituitary gland may mimic benign tumors, the location of pituitary involvement in imaging provides a higher possibility of differentiation between malignant and benign cancer. Most registered cases of metastasis to the pituitary were to the posterior lobe, which was attributed to its richer blood supply compared to the anterior lobe [12].

Treatment of metastasis to the pituitary consists of transcranial and transsphenoidal surgeries and treatment of the severe symptoms of diabetes insipidus and visual disturbance [13].

The trans-cranial approach can provide a definitive diagnosis by obtaining a biopsy of the sellar lesion, which requires an experienced neurosurgical team. It has been reported that while surgery provides histopathological confirmation of the disease, it does not increase the mean survival time, but it does improve the quality of life. Therefore, surgery should be performed on patients who have experienced a consistent reduction in the quality of their life or to decompress the optic nerves and chiasma [14].

Conclusion

The patient with metastatic cancer to the brain can present acutely with vomiting and hypotension, which are commonly

attributed to chemotherapy side effects or poor nutrition. Physicians can forget to consider hypopituitarism caused by metastasis as a cause. This could lead to incorrect diagnosis and management and put the patient's life at risk. It is essential to consider hypopituitarism in any patient with metastasis to the brain presenting with hypotension and electrolyte disturbance.

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