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Liver metastasis in an adolescent treated for third ventricle germ cell tumor

Rikki R. John,
Arul Premanand Lionel,
Venkatramani Sitaram[1],
Leni G. Mathew

Pediatric Hematology-Oncology, Pediatrics I, Division of Child Health, [1]Department of Hepatic Pancreatic and Biliary Surgery, Christian Medical College, Vellore, Tamil Nadu, India

Address for correspondence:
Prof. Leni G. Mathew,
Pediatric Hematology-Oncology,
Division of Child Health,
Christian Medical College, Vellore,
Tamil Nadu, India.
E-mail: lenimathew@cmcvellore.ac.in

ABSTRACT

Systemic dissemination of intracranial germ cell tumors (GCTs) occur only in 3% of cases and the common sites are bone, lungs, and lymph nodes. Metastasis to the liver is rare. As far as we could find, only six cases of liver metastasis of intracranial GCTs have been reported so far. We report an adolescent girl who presented with hepatic relapse 2½ years after successful completion of treatment of intracranial GCT. She was treated with chemotherapy and right hepatectomy and is doing well 30 months after treatment for the metastatic disease.

Key words: *Intracranial germ cell tumor, liver metastasis, extra cranial metastasis*

INTRODUCTION

Intracranial germ cell tumors (GCTs) account for about 2% of brain tumors in children in India.[1] Spread of tumor outside the primary site occurs in 10-30% of cases,[2] however, metastasis outside the central nervous system is rare. We report a case of liver metastasis in an adolescent, 2½ years after treatment for third ventricular GCT.

CASE REPORT

Initial presentation

A 14-year-old girl presented to us in 2008 with the complaints of headache, vomiting, and giddiness of 3 months duration. On examination, she had left hemiparesis and features of raised intracranial pressure. Magnetic resonance imaging (MRI) scan revealed an ill-defined nonenhancing, heterogeneous mass in the third ventricle measuring 4 cm × 3.5 cm × 3.5 cm. Both lateral ventricles were dilated, fourth ventricle was normal in size and the third ventricle not seen separately seen from mass. The sella and pituitary were normal.

A ventriculo-peritoneal (VP) shunt was placed as an emergency procedure. Serum and cerebrospinal fluid (CSF) alpha fetoprotein (AFP) were normal, however beta human chorionic gonadotrophin (HCG) levels were raised (13.0 mIU/mL in serum and 127 mIU/mL in CSF - normal <5 mIU/mL in serum and CSF). She received 2 cycles of chemotherapy using carboplatin (600 mg/m^2 on day 1), etoposide (100 mg/m^2 days 1-3 and days 22-24) and, ifosfamide (1800 mg/m^2 on days 22-26), followed by radiotherapy, 5040 cGy in 28 fractions.

Serum beta HCG levels came down to <1.00 mIU/mL and remained normal throughout her treatment period. Computed tomography (CT) scan done 4 weeks after starting treatment showed marked reduction in tumor. At the end of the treatment, beta HCG was normal and CT scan showed an ill-defined 1.1 cm × 1.0 cm hypodense lesion in the right basal ganglia; the third ventricular mass had resolved. She was on regular follow-up after treatment completion and her clinical and biochemical evaluation remained normal.

Hepatic relapse

Two and a half years after completion of treatment, she presented with progressive abdominal distension of

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1-month duration. She was deeply icteric; a hard nodular mass occupied the entire right side of the abdomen. Liver function tests were deranged with total bilirubin-22.7 mg%, direct bilirubin-21.5 mg%, total protein-7.0 g%, albumin-3.1 g%, serum glutamic oxaloacetic transaminase-241U/L, serum glutamic-pyruvic transaminase - 44U/L, alkaline phosphatase-615U/L prothrombin time international normalized ratio 1.98, beta HCG-199.3 mIU/mL, AFP-1.04 IU/mL, hepatitis B and C screen was negative. CT scan of abdomen showed a large predominantly cystic lesion with foci of solid enhancing areas occupying the right lobe of liver (segments 5, 6 and 7) with extension to segment 4B of left lobe, measuring approximately 12 cm × 8 cm × 9 cm. The mass was infiltrating the primary hilar confluence with intrahepatic biliary radicular dilatation and was encasing the gall bladder. There was significant periportal adenopathy. There was only mild ascites and the bowel, mesentery and omentum were normal. VP shunt was *in situ*. MRI brain did not show any recurrence and MRI of spine was normal.

She received a total of five courses of chemotherapy using carboplatin 600 mg/m^2 and bleomycin 15 mg/m^2. Carboplatin alone was given in the first course in view of her poor clinical condition. Following this her general condition improved, jaundice reduced and beta HCG dropped to 15.7 mIU/mL. After the third course of chemotherapy beta HCG level normalized and has remained normal since then. She underwent right hepatectomy with excision of segment 4B after four courses of chemotherapy. The tumor was found to occupy the whole of the right lobe except a small portion of segment 8. There were two periportal lymph nodes which were also excised and the peritoneal end of the VP shunt was removed. No ascites or peritoneal deposits were seen. Histopathology revealed a well-circumscribed tumor with extensive necrosis, foci of recent and old hemorrhage, chronic inflammation and fibrosis with areas of hyalinization. Immunohistochemistry was positive for placental alkaline phosphatase and CD30 which was consistent with GCT. The postoperative period was uneventful. After she recovered from surgery, she received the fifth course of chemotherapy.

She has been on regular follow-up and is well 30 months after the completion of relapse treatment.

DISCUSSION

Extracranial metastases of primary brain tumors are uncommon and those from GCT tumors are rare. Absence of lymphatic vessels in the brain and enclosure of the intracranial sinuses in a dense dural membrane may be factors, which are responsible for the rarity of systemic metastasis in brain tumors. Abdominal metastases have been associated with VP shunts[2] and neurosurgical procedures have been regarded as possible factors for systemic dissemination.[3]

Campbell *et al.*[4] did a clinical and pathological review of 917 cases of pediatric primary brain tumors and found only 21 cases with systemic metastasis (2.3%), 15 of which were medulloblastomas, and only two were GCT (teratoma and endodermal sinus tumor). Varan *et al.*[5] had reported extra-neural metastasis in only 10 out of 1,011 patients (0.98%) with pediatric brain tumors, of which two had GCT, one with lung and the other with liver metastasis.

Jennings *et al.*[2] reviewed 389 published cases of intracranial GCT. They found peritoneal and pelvic metastases in 10% of cases with VP shunt *in situ*, however only 3% had systemic dissemination which was mainly to the lung and bones.

Common sites for hematogeneous metastases of intracranial GCT are bone, lung, lymph nodes and soft tissue.[3,6] Metastasis to the liver, like our patient had, seems to be rare. We were able to find 6 reports of liver metastasis in patients with intracranial GCT, three were alive at the time of reporting and three[7-9] were autopsy findings with liver metastasis noted along with multiple other metastases. Of the three that were surviving at time of report two,[5,10] were doing well and one[5] had progressive disease and was on treatment.

Platinum-based chemotherapy seems to be the choice of treatment for intracranial GCT that has systemic dissemination.[10] Our patient was treated with carboplatin and bleomycin and required surgical excision as well. She is doing well 30 months after completion of treatment for metastatic disease

CONCLUSION

Liver is a rare site of extra-neural relapse of intracranial GCT. Platinum-based chemotherapy and complete resection may lead to long-term survival in these patients.

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