Isolated bone marrow metastasis of testicular tumor: A rare cause of thrombocytopenia

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Abstract
Isolated bone marrow metastasis of testicular tumor is very rare. Here, we report this case of a 21-year-old male who was admitted to our hospital with generalized body pain, which was severe and weakness for one month. He had a history of an operative intervention for the left testicular mass about 6 months ago which was diagnosed as mixed germ cell tumor on histopathological examination. The blood investigations showed anemia, low platelets, and elevated tumor markers. Bone marrow aspiration and biopsy examination showed metastatic deposits of mixed germ cell tumor. There were no foci of disease in any other part of the body. The patient was given chemotherapy, i.e. cisplatin, etoposide, and bleomycin. After completion of chemotherapy, there was drastic improvement in pain and weakness. A repeat examination of bone marrow done after 3 months was free of tumor.

Key Words: Bone marrow, germ cell tumor, metastasis

CASE REPORT
A 21-year-old male admitted to our hospital with generalized body pain and weakness for 1 month and was bedridden for the last 15 days. His history revealed an operative intervention for the left testicular mass 6 months before he came to our hospital with present complaint of 1 month duration. Histopathology reports from outside was suggestive of mixed germ cell tumor with 20% yolk sac tumor, 40% mature teratoma, and 40% immature teratoma component. Contrast-enhanced computed tomography of the chest and abdomen which was done at the time of surgery had no significant mediastinal/abdominal...
lymphadenopathy and positron emission tomography scan of whole body revealed no active disease. No further treatment was given. The patient remained asymptomatic for the next 5 months following surgery. After that, he developed generalized body pain in limbs and back which was progressive in nature. The pain was continuous and severe, and the patient was bedridden for 15 days. On physical examination, the patient was pale. There was no organomegaly and abdomen was soft. The rest of his systemic examination was within normal limit. Bone scan revealed poor uptake in the left iliac crest region. His serum alpha-fetoprotein level was markedly high, i.e., 100,227 ng/ml; beta-human chorionic gonadotropin level was 505.4 mIU/ml, and lactic dehydrogenase was 1413 U/L. The hemoglobin was 90 g/L, total leukocyte count (TLC) was $4.3 \times 10^9$/L, and platelet count (PLT) was $80 \times 10^9$/L. In view of his clinical history of back pain and investigation findings of reduced TLC and PLT count, the bone marrow aspiration examination was done in our hospital. Bone marrow aspiration smears showed groups and singly scattered tumor cells [Figure 1a]. These cells were highly pleomorphic, had high nuclear cytoplasmic ratio with moderate to abundant amount of vacuolated cytoplasm [Figure 1b]. Extracellular basal membrane [Figure 1c] like material was also noticed. Occasional syncytiotrophoblast [Figure 1d] was also seen. Bone marrow biopsy showed diffuse infiltration of the marrow spaces by same type of tumor cell [Figure 2a and b]. These cells were having high nucleocytoplasmic ratio, vesicular chromatin, and prominent nucleoli with moderate amount of cytoplasm [Figure 2c]. Immunohistochemistry on bone marrow biopsy showed tumor cells positive for cytokeratin, PLAP, and CD117, SALL4 and negative for CD30, and epithelial membrane antigen [Figure 2d]. Hence, diagnosis of metastatic germ cell tumor to bone marrow was made. The patient was started with chemotherapy and given 4 cycles of bleomycin, etoposide, and cisplatin. Palliative radiotherapy was given to spine and hemipelvis. On the last follow-up, after which was 20 months the completion of chemotherapy, his serum tumor markers were within normal range, and bone marrow examination showed no metastatic deposits. The patient is stable now and has resumed to his usual routine.

**DISCUSSION**

Mixed germ cell tumor are the second most common tumor after seminoma and constitute 32%–54% of all germ cell tumor. For correct diagnosis, appropriate sampling and correlation with the serum tumor markers are needed. Mixed germ cell tumor is the combination of teratoma, embryonal carcinoma, yolk sac tumor, and syncytiotrophoblastic cells with or without seminoma. Testicular tumor spreads by the lymphatic route to retroperitoneal lymph nodes. The course of lymphatic spread of germ cell tumor may be predicted as they spread via thoracic duct starting from paraaortic lymph nodes to mediastinal and then to supraclavicular lymph node. Hematogenous spread in testicular tumors is reported to the lungs, brain, bone, and liver. In a series by Hitchins et al., out of 297 patients with metastatic testicular and extragonadal germ cell tumor, bone metastasis was detected in 3% of those at first presentation and 9% at the time relapse. However, none of the patients had bone marrow metastasis. Kilickap et al. reviewed 73 cases of bone marrow metastasis and found breast cancer and lung cancer were most common tumor metastasizing to bone marrow followed by gastric cancer, prostate cancer, and Ewing sarcoma. Bone marrow metastasis of germ cell tumor has been reported in the three cases, but all of them were primary mediastinal nonseminomatous germ cell tumor. Although bone involvement has been documented in testicular

![Figure 1](image1.png)

Figure 1: (a-c) Bone marrow aspirate showing malignant tumor cells in groups with cytoplasmic vacuoles (Jenner-Giemsa, ×400). (d) Occasional syncytiotrophoblast seen (Jenner-Giemsa, ×400)

![Figure 2](image2.png)

Figure 2: Diffuse infiltration of the marrow spaces by tumor cells (a) (H and E, ×40) and (b) (H and E, ×100). (c) Tumor cells showing high N:C, vesicular chromatin, and prominent nucleoli (H and E, ×200). (d) Diffuse nuclear immunopositivity taken by tumor cells (SALL-4 immunohistochemistry, ×400)
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tumors, no literature is there on the involvement
of bone marrow to date. To the best of our knowledge,
this is the first ever case of testicular germ cell tumor with
metastasis to bone marrow. Bone marrow involvement usually
present as leukoerythroblastic picture in peripheral blood. In
our case, the patient was anemic and had thrombocytopenia
for which bone marrow examination was performed. In one
series, the authors found anemia in 77.7% and leukocytopenia
and thrombocytopenia in 33.3% of cases of bone marrow
metastasis. They found leukoerythroblastic picture in 2 out of
9 patients; however in index case, leukoerythroblastic picture
was absent. According to Kollmannsberger et al.,[11] majority of
relapses occur within 2 years of orchiectomy for clinical Stage
I nonseminoma while it is 3 years for Stage I seminomatous
tumors. On the contrary, relapse is rarely reported in cases of
advance and late stage disease.[11] The index case had Stage
I disease at the time of diagnosis, and he presented with
widespread disease within 5 months. Regular follow-up is
an inevitable phenomenon in oncology practice. As per our
intensive literature search to the best of our knowledge, this is
the first ever case report which depicts the isolated bone marrow
metastasis of testicular. The case highlights the role of bone
marrow examination in a case of a nonresponsive anemia and
thrombocytopenia in a follow-up case of testicular tumor to
rule out the possibility of bone marrow metastasis.

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Conflicts of interest
There are no conflicts of interest.

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