Aleukemic granulocytic sarcoma presenting at multiple sites: ovary, breast and soft tissue

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Abstract

An 18 year old female presented with the history of pain in abdomen, breast engorgement, swelling over both legs and breathlessness for three months. On clinical examination diagnosis of fibroadenoma breast was made. Ultrasonography of abdomen showed bilateral ovarian mass. Bilateral salpingo-oophrectomy was done and specimen was sent for histological examination. Two lobulated solid masses of tissues the larger one measuring 13×8×5 cm and smaller one measuring 10×7×5 cm in size received. Microscopic examination showed monomorphic population of discohesive, hyperchromatic small round cells had high N:C ratio, coarse chromatin, conspicuous nucleoli and scant to moderate amount of basophilic cytoplasm, lying in sheets and separated by fibrous strands and diffusely infiltrating the ovarian stroma. Fine needle aspiration from breast lump and leg swelling showed predominant population of blast cells. Myeloperoxidase was strongly positive and diagnosis of granulocytic sarcoma was confirmed.

Case Report

An eighteen year old female presented with the history of pain in abdomen, breast engorgement, swelling over both legs and breathlessness for three months. Clinical examination revealed bilateral breast masses. A clinical diagnosis of fibroadenoma breast was made. Bilateral ovarian mass were seen on ultrasonography of abdomen. Total leucocyte count was within normal limits. No blasts cells were identified in the peripheral blood smear. Bilateral salpingo-oophrectomy was done and specimen was sent for histological examination.

Gross

Two lobulated solid masses of tissues the larger one measuring 13×8×5 cm and smaller one measuring 10×7×5 cm in size received. Outer surface was encapsulated and cut surface of both the masses was tan grey with multiple small hemorrhagic and brownish areas (Figure 1A, B). Several pieces from different areas including center and outer surface were processed from both masses.

Microscopic examination

Sections processed showed monomorphic population of small round cells diffusely infiltrating the ovarian stroma. These cells were discohesive, lying in sheets and separated by fibrous strands of variable thickness. Cells were hyperchromatic, had high nuclear cytoplasmic ratio, coarse chromatin, conspicuous nucleoli and scant to moderate amount of basophilic cytoplasm. One-two mitotic figures per high power field were noted. One section showed large corpus luteum of ovary with central area of hemorrhage (Figures 1C-E).

Fine needle aspiration from breast lump and leg swelling were also done. Fine needle aspiration smears prepared showed predominant population of large round to oval cells with moderately high nuclear cytoplasmic ratio and moderate amount of pale blue cytoplasm. Nuclei were round to oval with two to four prominent nucleoli (blast cells). Few large monocytoid cells with prominent nucleoli were also seen (Figures 2C-E).

A diagnosis of small round cell tumor of ovary with differential diagnosis of Granulocytic sarcoma, Lymphoma, Small cell carcinoma and juvenile granulosa cell tumor was considered.

Immunohistochemistry for myeloperoxidase, LCA (CD45), CD 34, and placent alkaline phosphatase was done. It was strongly positive for myeloperoxidase. Rest three were negative (Figures 3A-D). A diagnosis of granulocytic sarcoma was confirmed.

A repeat peripheral blood smear examines but this time these smear showed normal total leucocyte count with occasional blast cells (Figure 2F). Patient was referred to oncology center for treatment. She did not report back to our center and lost to follow up.

Discussion

Ovarian involvement as the initial manifestation of lymphoma or leukemia is rare. Approximately half of the tumors are bilateral. Primary involvement of the ovary is exceedingly rare leading to under diagnosis of granulocytic sarcoma.
cytic sarcoma. It can arise de novo and precede the development of acute nonlymphocytic leukemia, or be the sole manifestation of relapse.

In granulocytic sarcoma of the breast the patients mainly present with the breast engorgement and a painless mass without associated local symptoms.

In granulocytic sarcoma ovary both diffuse and nodular growth patterns are encountered, but sclerosis can distort these patterns and result in compartmentalization of the neoplastic cells, as well as growth as nests and cords. The single-file arrangement of lymphoma and leukemic cells may simulate metastatic carcinoma, particularly one of breast origin. Granulocytic sarcoma on routine stains is often composed of cells with more finely dispersed nuclear chromatin and may have more abundant cytoplasm, which may be deeply eosinophilic. Confirmatory immunostaining may be crucial in making the diagnosis.

In granulocytic sarcoma the growth pattern may simulate invasive lobular carcinoma or malignant lymphoma. The neoplastic cells forming broad sheets or cords invade into and around normal mammary parenchymal structures. Intra-epithelial extension of the leukemic infiltrate simulates in situ carcinoma. The diagnosis of granulocytic sarcoma may be suggested by cytoplasmic granules in maturing myeloid cells or by the presence of relatively numerous mature myeloid cells scattered throughout the lesion. Special stains are especially helpful to establish the diagnosis. The tumor cells do not contain mucin and they give a negative reaction for immunocytochemical epithelial markers such as cytokeratin and anti-endomysial antibodies. The diagnosis of granulocytic sarcoma can be established by fine needle aspiration biopsy if immature myeloid cells are recognized in the cytologic specimen. The differential diagnosis includes non-Hodgkin lymphoma (predominantly mucosa-associated lymphoid tissue lymphoma and diffuse large B-cell lymphoma), small round cell tumors, granulosa cell tumor, undifferentiated carcinoma and in case of breast, lobular carcinoma also. A complete panel of immunohistochemistry is helpful to recognize this entity with an isolated presentation. Granulocytic sarcoma is immunoreactive for myeloperoxidase, CD117 and CD68, CD43 is positive in most of the cases, and 75% are reactive for CD45. Lysozyme and CD68 PGM1 expression are evidence for monocytic differentiation. Multiple sites involvement in single patient was reported in literature. In the presented case multiple sites (both ovaries, both breasts, and leg swelling) were involved. The clinical outcome and the prognosis in this group of patients is poor.

**Figure 1.** A) Gross: lobulated solid mass of ovary; B) cut surface of masses was tan grey with raised lobulated areas; C) monomorphic population of small round cells diffusely infiltrating the ovarian stroma with large corpus luteum of ovary (arrow); Hematoxylin & Eosin 100x); D) monomorphic population of small round cells infiltrating the capsular (Hematoxylin & Eosin 100x); E) monomorphic population of small round cells diffusely infiltrating the ovarian stroma adjacent to leuteal cells (arrow, Hematoxylin & Eosin 100x); F) proliferating blood vessels and diffuse infiltration of hyperchromatic small round cells with high N:C ratio (Hematoxylin & Eosin 400x).

**Figure 2.** A) Large proliferating blood vessel surrounded by monomorphic population of small round cells (Hematoxylin & Eosin 100x); B) hyperchromatic small round cells had high N:C ratio, coarse chromatin and scant to moderate amount of basophilic cytoplasm (Hematoxylin & Eosin 100x); C) Fine needle aspiration (FNA) left breast: large round to oval cells with high nuclear cytoplasmic ratio and 2 to 4 nucleoli (Giemsa 1000x); D) FNA right breast: large round to oval cells with high nuclear cytoplasmic ratio and 2 to 4 nucleoli (Giemsa 1000x); E) FNA leg swelling: large round to oval cells with high nuclear cytoplasmic ratio and 2 to 4 nucleoli (Giemsa 1000x); F) peripheral blood smear: large round to oval cells with high nuclear cytoplasmic ratio and 2 to 4 nucleoli (Giemsa 1000x).
Conclusions

Granulocytic sarcoma is uncommon in ovary and breast neoplasm and the clinical presentation without development of leukemia or myeloproliferative disorder is extremely rare. Immunohistochemistry and Ancillary studies are necessary to recognize this entity.

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Figure 3. Immunohistochemistry: A) myeloperoxidase strongly positive in tumor cells (400×); B) LCA (CD45) was negative in tumor cells, infiltrating normal lymphocytes are positive (400×); C) placental alkaline phosphatase is negative in tumor cells (400×); D) vimentin is negative in tumor cells (400×).