

Retroperitoneal extraskeletal osteosarcoma with cystic change arising from heterotopic ossification: a rare entity

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Abstract

Extraskeletal osteosarcoma arising from myositis ossificans or heterotopic benign ossification is an extremely rare entity. Heterotopic ossification under rare circumstances may undergo malignant transformation and give rise to extraskeletal osteosarcoma however diagnosis of such transformation requires the presence of a remnant of the benign precursor lesion. Most of the cases reported as secondary extraskeletal osteosarcoma did not contain residual tissue of the previous benign condition and its presence was suggested solely on the basis of clinical course without any histopathological or radiological evidences. We describe a case of secondary extraskeletal osteosarcoma of retroperitoneum showing morphologic evidence of heterotopic benign ossification with extensive cystic change in an eighty- five year old female.

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Introduction

Extraskeletal osteosarcoma is a malignant mesenchymal tumor of soft tissues without attachment to the bone or periosteum, composed of neoplastic cells that recapitulate the phenotype of osteoblasts and synthesize bone. Extraskeletal osteosarcoma arising from myositis ossificans or heterotopic benign ossification is an extremely rare entity. Heterotopic ossification is a benign process that can occur after an operation, a neurological injury, poliomyelitis, thermal or electrical burn [1] and rarely it may develop spontaneously without prior history of trauma [2, 3]. It frequently occurs in tendons, fasciae, skeletal muscle, subcutaneous fat, and organs like kidney or breast. Under rare circumstances it may undergo malignant transformation and give rise to extraskeletal osteosarcoma and diagnosis of such transformation requires the presence of a remnant of the benign precursor lesion. Most of the cases reported as secondary extraskeletal osteosarcoma did not contain residual tissue of the previous benign condition and its presence was suggested solely on the basis of clinical course without any histopathological or radiological evidences [4,5,6,7]. We describe a case of secondary extraskeletal osteosarcoma of retroperitoneum showing morphologic evidence of heterotopic benign ossification with extensive cystic change in an eighty - five year old female.

Case Report

An Asian female patient in her ninth decade presented with gradually increasing mass in abdomen of two year duration. There were no complains pertaining to bladder or bowel habits. There was no history of previous trauma, surgery or radiotherapy. Per abdominal examination revealed a non tender firm mass in upper abdomen measuring 14x10cms. There was no ascites or any other palpable mass.

Patient's biochemical tests were within normal limits except for mildly elevated S. Alkaline Phosphatase levels. CECT revealed a predominantly cystic mass with extensive curvilinear calcification in the anterior wall. Mass was displacing adjacent organs and was separate from adjacent bony structures. Right kidney was seen separate from the mass and appeared morphologically normal [Fig.1]. Mass was abutting left kidney but not arising from it [Fig. 2]. Based on these findings a radiologic diagnosis of isolated hydatid cyst was suggested and thus FNAC was not performed.

On laprotomy mass was lying in retroperitoneum with splaying of pancreas over anterior surface. It was adhered to spleen, pancreas and gall bladder but not infiltrating into these organs. Mass with adhered spleen, body of pancreas and gall bladder was resected. Grossly it was a cystic mass measuring 17x17x7cms, filled with hemorrhagic necrotic material adhered to its inner wall. Cyst wall thickness varied from 0.5 to

2.5cms with few gritty areas in its anterior wall [Fig. 3].



Fig 1: Axial section of delayed phase CT showing hypodense round lesion with rim calcification on left side of abdomen. Right kidney is also visualised in this section in right renal fossa with excreted contrast material in the calyceal system.



Fig 2: Reformatted sagittal CT image showing hypodense lesion abutting left kidney. The lesion is causing mass effect on left kidney but clearly not arising from it.

Microscopic sections from cyst wall revealed thick fibrocollagenous tissue with adhered hemorrhagic necrotic material on its inner side. Rest of the cyst wall showed varied morphology with proliferation of



Fig 3: Gross: Cystic mass filled with hemorrhagic necrotic material adhered to its inner wall.

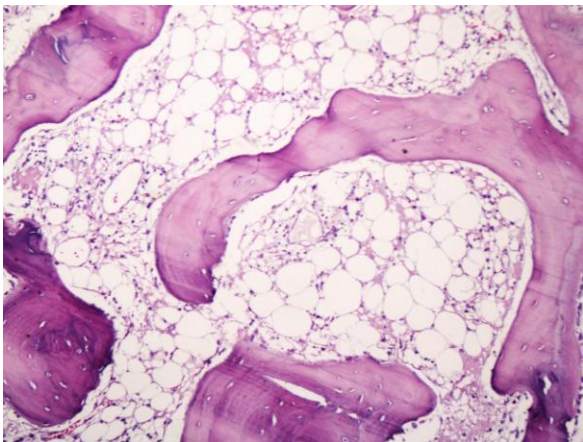


Fig 4: Section shows mature bony trabeculae enclosing fatty marrow suggestive of longstanding heterotopic ossification (H&E, 400x).

spindle cells in fascicles and whorls displaying mild to moderate nuclear pleomorphism, bland to coarse chromatin with areas of mature lamellar bone. Possibilities of spindle cell lesions with metaplastic bone were considered, that included fibrosarcoma, synovial sarcoma and malignant peripheral nerve sheath tumor. Features suggesting leiomyosarcoma, like blunt ended nuclei with acidophilic fibrillary cytoplasm and cytoplasmic vacuolations at the end of the nuclei were not present. Sections from spleen, body of pancreas and gall bladder were unremarkable. Immunohistochemical (IHC) panel for vimentin, smooth muscle antigen, cytokeratin, epithelial membrane antigen, S100 and Desmin was put up. Present case showed positivity for vimentin and only very focal and weak smooth muscle actin positivity. Since results of IHC panel were inconclusive more sections were taken that revealed confluent areas of mature lamellar bone enclosing fatty marrow [Fig.4] intermingled with areas of disorderly laid lacy osteoid entrapping malignant

cells [Fig. 5, 6] and scattered osteoclastic giant cells. Mitotic activity was 1-2/ 10hpf. No zoning phenomenon was observed. Considering the co-existence of malignant osteoid and benign metaplastic bone containing fatty marrow, the diagnosis of secondary extraskeletal osteosarcoma of retroperitoneum probably arising from heterotopic benign ossification was considered. However it is worth mentioning that for the present complaints patient had obtained medical advice for the first time and hence there was no previous radiological or histopathological evidence suggesting the sequential events.

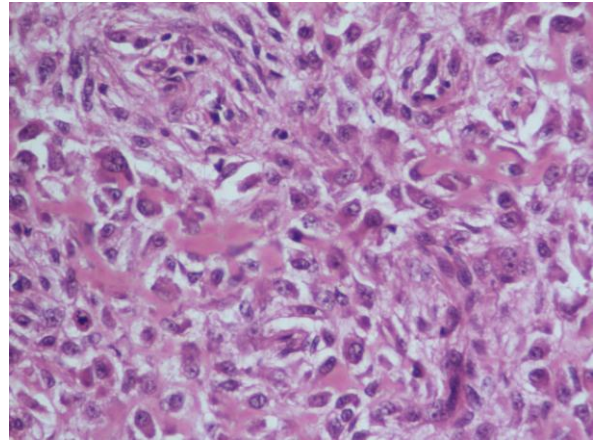


Fig 5: Section shows disorderly laid lacy osteoid entrapping malignant cells (H&E, 100x).

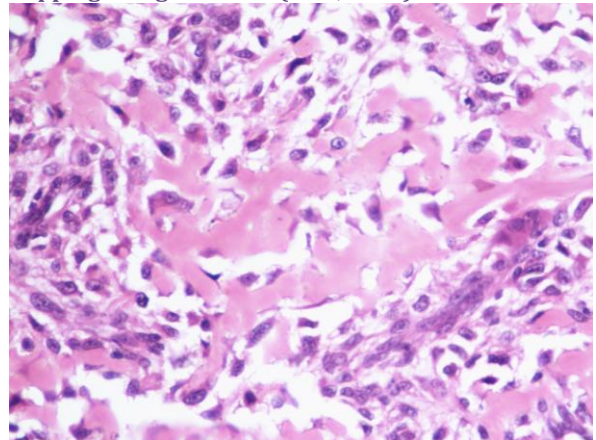


Fig 6: Section shows neoplastic osteoid entrapping malignant cells. (H&E, 400x).

Discussion

Extraskeletal osteosarcoma is a rare tumor constituting 4% of osteosarcoma and 1.2% of soft tissue sarcomas [8]. The most common location being lower extremity (47%) followed by upper extremity (20%) and retroperitoneum (17%) [9]. In contrast to osteosarcoma of bone, extraskeletal osteosarcoma occurs in older individuals [9]. Most of the published cases of secondary extraskeletal osteosarcoma failed to show the coexisting heterotopic benign ossification and as mentioned by Huvos [10] the probable reason for this was destructive nature of the high grade osteosarcoma

however, very few case reports on secondary extraskeletal osteosarcoma had histologic proof of pre-existing benign ossification^[1,10,11,12,13].

Aboulaflia et al^[1] reported a case of extraskeletal osteosarcoma arising from heterotopic ossification secondary to an electrical burn in a 44 year old male that developed 10 years after the initial injury.

Eckardt et al^[11] reported a well documented case of malignant transformation of heterotopic bone in a 32 year old man with dermatomyositis and extensive calcinosis cutis who developed a calcified mass in thigh. Initial biopsy report in this patient was consistent with heterotopic ossification whereas subsequent examination of the mass, 13 years later revealed development of high grade osteosarcoma at the same site.

Elas Valderrma^[12] described a unique case of extraskeletal osteosarcoma arising within a hamartomatous thymus located in the left pleural cavity of 10 year old girl. Hamartoma contained abundant mature lamellar bone from which the osteosarcoma had developed.

Eiichi Konishi et al^[13] described a case of extraskeletal osteosarcoma in 53 year old woman that developed from malignant transformation of myositis ossificans involving the volar aspect of the left wrist. In this case radiograph showed rim like ossification favouring myositis ossificans the author suggested that if the lesion has rim like ossification in soft tissue then the possibilities of myositis ossificans and ossifying fibromyxoid tumor should be considered, however ossifying fibromyxoid tumor often shows thin and incomplete ring or shell like ossification in radiograph.

Differential diagnoses which closely mimic this kind of presentation include extraskeletal osteosarcoma, myositis ossificans and ossifying fibromyxoid tumor. Myositis ossificans shows zoning pattern comprising of immature, loose spindle cells in central area, mid-zone of osteoid and fibroblasts, outer zone of mature lamellar bone. Mitosis and nuclear pleomorphism are absent. Ossifying fibromyxoid tumor shows lobules of loosely arranged tumor cells separated by thick collagen fibres with minimal nuclear pleomorphism and few mitoses^[14]. Extraskeletal osteosarcoma shows disorderly laid lacy osteoid entrapping malignant cells with areas of necrosis, mitotic figures and nuclear pleomorphism as noted in present case. Table (I) summarises important distinguishing features of these lesions.

The present case showed incomplete rim of ossification in its anterior wall with extensive cystic change. The mass was there for last two years however patient noticed gradual increase in its size and histological examination showed areas of extraskeletal osteosarcoma along with the presence of mature lamellar bone enclosing fatty marrow indicating the long standing nature of the lesion. However clear cut features of myositis ossificans like zoning phenomenon or complete peripheral shell of ossification were not seen in the present case, hence it is difficult to call it myositis ossificans though the presence of well formed bony trabeculae with fatty marrow are highly suggestive of long standing heterotopic benign ossification giving rise to secondary extraskeletal osteosarcoma of retroperitoneum.

Extensive cystic change is another uncommon finding in our case. Barbara L Bane et al^[8] studied a large

Table I: Differentiating features of extraskeletal osteosarcoma, myositis ossificans and ossifying fibromyxoid tumor.

Features	Extraskeletal Osteosarcoma	Myositis Ossificans	Ossifying Fibromyxoid Tumor
Age	6-7 decade	2-3 decade	5 decade
Radiograph	Egg shell ossification	Central ossification	Irregular ring or shell like pattern of soft tissue densities.
Site	Muscles of extremities, retro-peritoneum	Muscles of extremities	Extremities, trunk and head –neck
Neoplastic osteoid	Disorderly laid lacy osteoid with entrapment of malignant cells.	Absent	Absent
Zonal pattern	Absent	Present	Absent. Lobules of loosely arranged tumor cells separated by thick collagen fibres
Pleomorphisism	Moderate– marked	Absent to mild	Minimal to absent
Mitoses	Atypical mitosis	Absent	Few
Prognosis	Poor	Good	Good

series of 26 cases of extraskeletal osteosarcoma and found that some tumors showed focal to extensive cystic change. A E Rosenberg et al ^[15] quoted that less than 10% of cases exhibit extensive hemorrhagic cystic change.

Prognosis of extraskeletal osteosarcoma is reported to be poor and approximately 75% of patients die of disease within 5 years of diagnosis. Our patient was free from any symptoms pertaining to current illness or any other illness for six months after surgery after which patient was lost to follow-up. Treatment for Extraskeletal osteosarcoma involves wide resection, radiotherapy and chemotherapy ^[16].

Conclusion

This case is being reported because of its rarity, unusual presentation in ninth decade as a large cystic mass with highly variable morphology leading to the difficulty in its correct diagnosis which is extremely important in view of appropriate management.

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Competing Interests

None declared.

References

1. Aboulafia AJ, Brooks F, Piratzky J, Weiss S. Osteosarcoma arising from heterotopic ossification after an electrical burn. A case report. *J Bone Joint Surg Am.* 1999;81:564-70.
2. De Santis E, Rosa MA, Gasparini G. Circumscribed spontaneous heterotopic ossification in the soft tissues simulating sarcoma. *Ital J Orthop Traumatol.* 1987;13:207-17.
3. Chai ZW, Wang JJ, Song HY, He J. Spontaneous heterotopic ossification around the hip joint: a case report. *Zhongguo Gu Shang.* 2009;22:65.
4. Shipley AM. Ossifying hematoma and allied conditions. *Arch Surg.* 1940; 41:516-24.
5. Pack GT, Braund RR. The development of sarcoma in myositis ossificans report of three cases. *JAMA.* 1942;119:776-9.
6. Kuhlmann RF, Lavell TE. Juxtacortical osteogenic sarcoma following trauma: case report. *Ann Surg.* 1965;162:1087-90.
7. Sordillo PP, Hajdu SI, Magill GB, Golbey RB. Extrasosseous osteogenic sarcoma. A review of 48 patients. *Cancer.* 1983;51:727-34.
8. Bane BL, Evans HL, Ro JY, Carrasco CH, Grignon DJ, Benjamin RS. Extraskeletal osteosarcoma. A clinicopathologic review of 26 cases. *Cancer.* 1990;65:2762-70.
9. Secil M, Mungan U, Yorukoglu K, Dicle O. Case 89: Retroperitoneal extraskeletal osteosarcoma. *Radiology.* 2005;237:880-3.
10. Huvos AG. The spontaneous transformation of benign into malignant soft tissue tumors (with emphasis on extraskeletal osseous, lipomatous and Schwannian lesions). (Suppl) *Am J Surg Pathol.* 1985;9:7-20.
11. Eckardt JJ, Ivins JC, Perry HO, Unni KK. Osteosarcoma arising in heterotopic ossification of dermatomyositis: case report and review of the literature. *Cancer.* 1981;48:1256-61.
12. Valderrama E, Kahn LB, Wind E. Extraskeletal osteosarcoma arising in an ectopic hamartomatous thymus. Report of a case and review of the literature. *Cancer.* 1983;51:1132-7.
13. Konishi E, Kusuzaki K, Murata H, Tsuchihashi Y, Beabout JW, Unni KK. Extraskeletal osteosarcoma arising in myositis ossificans. *Skeletal Radiol.* 2001;30:39-43.
14. Goyal P, Sehgal S, Agarwal R, Singh S, Gupta R, Kumar A. Ossifying fibromyxoid tumor -Diagnostic challenge for a cytopathologist. *Cytojournal.* 2012;9:17
15. Rosenberg AE, Heim S. Extraskeletal osteosarcoma. In, *Pathology and Genetics of Tumors of Soft Tissue and Bone, World Health Organization Classification of Tumours.* Edited by Christopher D.M. Fletcher, Krisjnan Unni and Fredrik Mertens. France: IARC Press, 2002: 182-183.
16. Fang Z, Yokoyama R, Mukai K, Beppu Y and Fukuma H. Extraskeletal osteosarcoma: a clinicopathologic study of four cases. *Jpn J Clin Oncol.* 1995;25: 55- 60.