ORIGINAL RESEARCH PAPER

Volume-8 | Issue-2 | February-2019 | PRINT ISSN No 2277 - 8179

INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

HISTOPATHOLOGICAL EXAMINATION AND CLINICOPATHOLOGICAL CORRELATION OF PRIMARY OSTEOSARCOMA OF BONE.A STUDY OF 50 CASES.

Pathology

Dr. Dhaval Jetly Associate Professor and Head, Department of Pathology, Gujarat Cancer and Research Institute, Ahmedabad

Dr. Vishal Modi* 3rd Year Resident, Department of Pathology, Gujarat Cancer and Research Institute, Ahmedabad *Corresponding Author

ABSTRACT

Osteosarcoma(OS) is the most common primary tumor of bone, with a low incidence. osteosarcoma comprises a family of lesions with diverse in histologic features and grade. Its prognosis is dependent on the histology and prognostic parameters. It may occur inside the bones (in the intramedullary or intracortical compartment), on the bone surface and extraosseous sites.OS occurs in a varied age group and with different radiological features . This review summarizes the anatomic,clinical and histologic variations of osteosarcoma.

KEYWORDS

Osteosarcoma,Bone,Histology

INTRODUCTION

Osteosarcoma is the most common primary tumor of bone, yet its absolute incidence among malignant tumors is low. Within its strict histologic definition, osteosarcoma comprises a family of lesions with considerable diversity in histologic features and grade. Its prognosis is dependent not only on these parameters but also on its anatomic site. It may occur inside the bones (in the intramedullary or intracortical compartment), on the surfaces of bones, and in extraosseous sites. Information of diagnostic or prognostic significance has not been elucidated from studies of its cytogenetics. This review summarizes the anatomic and histologic variations of osteosarcoma .

At an estimated incidence of 2 cases per million persons per year, Although it occurs at any age, its peak incidence is in the second and third decades.

It is a malignant tumor of connective tissue (mesodermal) origin within which the tumor cells produce bone or osteoid (often referred to as "tumor bone" or "tumor osteoid" in the vernacular). This has given rise to the 3 traditional subdivisions of osteoblastic, chondroblastic, and fibroblastic osteosarcoma. Although osteosarcoma usually arises in the medullary cavity of the metaphysis of a growing long tubular bone, it also may arise on the surface of a bone, it may be confined to the cortex, or it even may arise in an extraskeletal site.Patients with osteosarcomas usually have nonspecific clinical symptoms, the most common of which is pain for several weeks or months. The most common sign is a mass that is almost always firm and tender.

The imaging studies usually suggest an ill-defined radiodensity occupying the metaphyseal region of a long bone. The intraosseous density often has a diffusely cloudy or fluffy appearance. As the tumor reaches the outer cortical surface, the periosteum is dissected from the bone. The cambium layer of the inner periosteum reacts to separation from the cortex by producing new bone, which is sometimes visible as an incomplete bony shell that appears attached to the bone surface on only one end and is open or discontinuous in the middle, so-called Codman angle. Other kinds of periosteal reactions may cause so-called sunburst or hair-on-end radiographic densities.

MATERIALS AND METHODS

A retrospective study, of Osteosarcoma (50 cases) was done at GCRI for the period from October 2013 to September 2015. Each case was investigated according to following details: patients' details, registration no., name, age, sex, clinical examination & type of specimen. Institutional Review Board (IRB) committee has approved this study for the publication and for further research purposes. On Histopathological Examination, specimens & biopsies were fixed in 10% neutral formalin, embedded in paraffin wax, stained with Hematoxylin and eosin (H & E) & mounted with DPX, which were examined for the following characteristics: growth pattern, cell size, cell shape, nuclear characteristics, radiological examination, pleomorphism, mitosis, stroma & necrosis. Radiological findings (X ray, CT scan, MRI, etc.) of all patients are obtained from patient medical records.

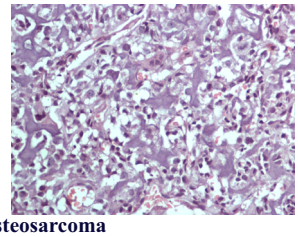
OBSERVATION AND RESULTS

The median age as per our study was 19 years.Male :Female was 1.3:1

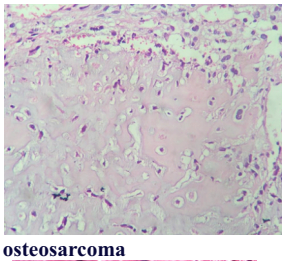
Histological subtypes	No. of cases
Conventional- Osteoblastic	25
Chondroblastic	10
Fibroblastic	02
Osteosarcoma of jaw bone	05
Telangiectatic	03
OS – GCRO	02
OS – MFH	03

SITE

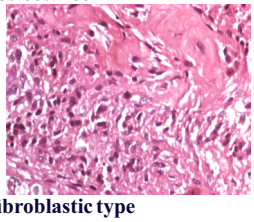
Sr no	Site (Bone involved by tumor)	No.of cases	Percentage(%)
1	Femur	25	50
2	Tibia	11	22
3	Humerus	05	10
4	Mandible	04	08
5	Radius	01	02
6	Fibula	01	02
7	Rib	O1	02
8	Maxilla	01	02
9	Ulna	01	02



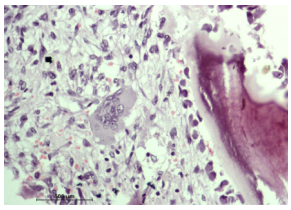
1.osteoblastic osteosarcoma



2.chondroblastic osteosarcoma



3.osteosarcoma ,fibroblastic type



4.osteosarcoma,giant cell rich type

DISCUSSION

A total of 50 cases of osteosarcoma of bone, presented at the Gujarat Cancer & Research Institute, Ahmadabad, from September 2013 to October 2015 were included in this study.

Histomorphology and radiological findings were compared with similar studies carried out in the past.

In present study osteosarcoma most commonly found in the second decade of life (median age 19 years) with male were slightly more affected than female (M:F - 1.3:1)

Most common site involved was lower end of femur (25 cases-50%) followed by upper end of tibia (11 cases – 22%), upper end of humerus (5 cases – 10%).

In our study most common histological subtype was osteoblastic osteosarcoma which accounts for 50%, followed by chondroblastic osteosarcoma (20%), fibroblastic osteosarcoma (4%).

Present study's statistics such as sex ratio, most common age group, most common type and site are comparable with study by Ottaviani G et al[1], Mark DM et al[3], and Frank G et al.[2]

Sr. no.	Study	M:F	Common age	Commonest Type	Commonest Site
1	Ottaviani G et al	1.35:1	2nd decade	Osteoblastic osteosarcoma – 70%	Femur - 42%
2	Murphy MD et al	1.7:1	2nd decade	Osteoblastic osteosarcoma – 65%	Femur - 40%
3	Frank G et al	M>F	2nd decade	Osteoblastic osteosarcoma	Femur - 40%
4	Present study	1.3:1	2nd decade	Osteoblastic osteosarcoma – 50%	Femur - 50%

There is variation in the percentage of histological subtype of conventional osteosarcoma but it may have occurred due to lack of extensive sampling in biopsy. In biopsy the tumor matrix may be misleading and suggestive of other subtype than actual diagnosis due to site selection, small quantity of material or it may be due to a subjective bias.

CONVENTIONAL OSTEOSARCOMA

Osteosarcoma is a primary intramedullary high grade malignant tumor in which the neoplastic cells produce osteoid, even if only in small amounts.

The precise etiology of conventional osteosarcoma remains unknown.

Although a history of trauma is frequently elicited, it is felt that trauma draws attention to the tumor rather than causing it. Paget disease of bone and radiation exposure have long been associated with an increased incidence of osteosarcoma. Although a wide variety of other tumors (e.g., osteoblastoma, osteochondroma, and fibrous dysplasia) and non-neoplastic conditions (e.g., osteomyelitis, and metal endoprosthesis implantation) have been linked with osteosarcoma.

Conventional osteosarcoma shows a profound propensity for involvement of the long bones of the appendicular skeleton; in particular, the distal femur,proximal tibia, and proximal humerus. It tends to be a disease of the metaphysis (91%) or diaphysis (<9%). Although the long bones remain the most frequent sites ofprimary conventional osteosarcoma, the relative incidence in non-long bone (i.e. jaws, pelvis, spine, ribs and skull) involvement tends to increase with age. Osteosarcoma arising in bones distal to the wrists and ankles is extremely unusual.

Symptoms generally develop over a period of weeks to a few months. Early symptoms may wax and wane and thereby be difficult to interpret; eventually, they become unremitting. Although relatively non-specific, pain, with or without a palpable mass, is the cardinal symptom of conventional osteosarcoma.

A sudden dramatic increase in tumor size is generally attributable to secondary changes such as intra-lesional haemorrhage.

It may be purely osteoblastic or osteolytic. In most cases, it is a mixed lytic/blastic lesion accompanied by cortical destruction and tumor extension into soft tissue. Tumors tend to be eccentric and the linear growth within the medullary cavity tends to stay ahead of its soft tissue counterpart. Rarely, noncontiguous intra-medullary growth within the parent bone or across adjacent joints may take place (i.e., "skip metastases"). Soft tissue masses tend to be variably mineralized with the least calcification at the periphery. Tumor / periosteal interaction may lead to a variety of manifestations secondary to periosteal elevation (e.g., Codman's triangle) and periosteal reactive bone formation.

Conventional osteosarcomais frequently referred to as a "spindle cell" tumor; a reference which over-simplifies its cytological appearance. It tends to be a highly anaplastic, pleomorphic tumor in which the cells may be: epithelioid, plasmacytoid, fusiform, ovoid, small round cells, clear

20cells, mono- or multinucleated giant cells, or, spindle cells. Most cases are complex mixtures of two or more of these cell types.

The diagnosis of osteosarcoma is predicated on the accurate identification of osteoid. Histologically, osteoid is a dense, pink, amorphous intercellular material, which may appear somewhat refractile.

It must be distinguished from other eosinophilic extra-cellular materials such as fibrin and amyloid. Unequivocal discrimination between osteoid and non-osseous collagen may be difficult, and at times somewhat arbitrary. Non-osseous collagen tends to be linear, fibrillar, and compresses between neoplastic cells. Incontrast, osteoid is curvilinear with small nubs, arborisation, and, what appears to be abortive, lacunae formation.

The thickness of the osteoid is highly variable with the thinnest referred to as "filigree" osteoid. Osseous matrix also has a predispositionfor appositional deposition upon previously existing normal bone trabeculae (i.e., "scaffolding"). When neoplastic cells are confined within large amounts of bone matrix, they frequently appear as small, pyknotic, minimally atypical cells, a feature referred to as "normalisaton." An under-appreciated architectural feature is the tendency for conventional osteosarcoma to grow in an angiocentric fashion which imparts an overall "basket-weave" or "cording" pattern to the tumor.

However, study by Bacci G et al and Hauben EI et al showed that there is no relationship between subtype and treatment and prognosis in conventional osteosarcoma.

CONCLUSION

After studying of **50 cases of osteosarcoma**, we have found that,

- **Conventional osteosarcoma** is most common subtype with **osteoblastic** differentiation.
- **Male** are more commonly affected than females.
- Osteosarcoma showed peak incidence in **second decade** of life with another small peak after the age of 40 years.
- **Metaphysis** of the long bones are most commonly affected sites with **distal femur** being most common followed by proximal tibia and proximal humerus.
- Radiological findings are very helpful for primary diagnosis and to know the extent of the tumor, but not useful to differentiate between histological subtypes.
- Histological diagnosis remains the gold standard for subtyping and grading.

Thus, one should always consider histopathological and clinico-radiological correlation before arriving at the diagnosis of osteosarcoma.

REFERENCES

1 Fletcher C.D.M., Bridge JA.,Hogendoorn PCW, Mertens F. (Eds.): World Health Organization Classification of Tumours of Soft Tissue and Bone. IARC Press: Lyon; 2013. Pp 240-241
2. A.Prof Frank Gaillardet al. https://radiopaedia.org/articles/osteosarcoma.
3. Mark DM, Mark RR, Gina AM et al, The many faces of osteosarcoma, Radiographic 1997; 17:1205-1231.
4. Bacci G, Longhi A, Versari M et al. (2006). Prognostic factors for osteosarcoma of the extremity treated with neoadjuvant chemotherapy: 15-year experience in 789 patients treated at a single institution. Cancer 106: 111161
5. Hauben EI, Weeden S, Pringle J, Van Marck EA, Hogendoorn PCW (2002). Does the histological subtype of high-grade central osteosarcoma influence the response to treatment with chemotherapy and does it affect overall survival? A study on 570 patients of two consecutive trials of the European Osteosarcoma Intergroup. Eur J Cancer 38: 1218-1225.
6. NCI (2011). SEER Cancer Statistic Review, 1975-2008. National Cancer Institute, Bethesda. Bethesda:National Cancer Institute.
7. Rosai, Juan, Lauren V. 1905- Ackerman, and Juan Rosai. Rosai and Ackerman's Surgical Pathology. 9th ed. St. Louis, Mo.: London: Mosby, 2004.
8. Collins DH (1956). Pagets disease of bone; incidence and subclinical forms. Lancet 271:51-57.
9. Giunti A, Laus M (1978). Malignant tumours in chronic osteomyelitis. (A report of 39 cases, 26 with long term follow up). Ital J Orthop Traumatol 4:171-182.
10. Haibach H, Farrell C, Dittrich FJ (1985). Neoplasm arising in Paget's disease of bone: A study of 82 cases. Am J Clin Pathol 83:594-600.
11. Gillespie WJ, Frampton CM, Henderson RJ et al (1988). The incidence of cancer following total hip replacement. J Bone Joint Surg Br 70:539-542.
12. Kumar, Vinay, and Stanley L. 1915- Robbins. Robbins Basic Pathology. 8th ed. Philadelphia, PA: Saunders/Elsevier, 2007.
13. Fletcher C.D.M., Bridge JA.,Hogendoorn PCW, Mertens F. (Eds.): World Health Organization Classification of Tumours of Soft Tissue and Bone. IARC Press: Lyon; 2013. Pp 240-241
14. Dahlin DC, Coventry MB (1967). Osteogenic sarcoma. A study of six hundred cases. J Bone Joint Surg Am 49: 101-110.
15. ttaviani G, Jaffe N (2009). The Epidemiology of Osteosarcoma. Cancer Treat Res 152:3-13