RESEARCH ARTICLE

Prevalence and Profile of Bone Metastases in the Oncology Department of Treichville University Hospital in Cote d'Ivoire

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Abstract

Introduction: Bone metastases are a frequent manifestation of advanced cancers. They cause major skeletal-related complications and significantly impair patients' quality of life.

Materials and Methods: A retrospective, descriptive study was conducted among all patients with bone metastatic cancer followed at the Oncology Department of Treichville University Hospital between January 2019 and December 2023. Data were collected from medical records and analyzed using SPSS 12.0 software.

Results: Among 917 patients with metastatic cancer, 358 (39.04%) had at least one secondary bone lesion, with a sex ratio of 1.01 and a mean age of 47.76 ± 8.6 years. Bone metastases were most frequent in breast cancer (28.21%), followed by prostate (26.26%) and lung cancer (14.25%). In most cases (75.98%), bone metastases were diagnosed concomitantly with the primary tumor, most often using CT scans (56.15%). The spine was the most common site (44.97%), and lesions were diffuse in 28.77% and osteolytic in 68.92%. Lesions were multiple in 91% of patients. Skeletal-related events were recorded in 61.38% of cases, consisting of pain (63.85%), spinal cord compression (24.41%), and pathologic fractures (11.74%). Hypercalcemia was noted in 26.29% of patients tested. Bone metastases were frequently associated with pulmonary (26.03%), hepatic (21.92%), lymph node (18.72%), or cerebral (2.74%) metastases.

Conclusion: Bone metastases represent a significant proportion of advanced cancers in our setting. They occur mainly in breast and prostate cancers, frequently affecting the spine and leading to severe complications that justify early detection and optimized supportive care strategies.

Keywords: Prevalence; Bone Metastases; Skeletal-Related Events; Treichville; Abidjan; Côte d'Ivoire

Introduction

Bone metastases are a frequent and challenging manifestation of advanced cancer, affecting approximately 20–30% of cancers patients at diagnosis or during the course of their disease [1]. They compromise the structural integrity of the skeleton, increasing the risk of skeletal-related events (SREs) such as spinal cord compression, pathological fractures, hypercalcemia, severe bone pain, and the need for bone surgery or radiotherapy [2]. These events markedly deteriorate patients' quality of life and represent a major therapeutic challenge [3]. Certain malignancies, such as breast, prostate, and lung cancers, are particularly associated with a high risk of bone metastases [4,5]. Approximately 65% of patients with advanced breast cancer and up to 90% of those with advanced prostate cancer will develop bone metastases during their disease course [4,5]. In Côte d'Ivoire, these cancers are among the most common, often diagnosed at an advanced stage due to delayed presentation [6,7].

The Oncology Department of Treichville University Hospital is a national reference center for cancer management in Côte d'Ivoire. While several studies from Europe and North America have evaluated the incidence and impact of skeletal-related events [8,9], local data remain scarce. Understanding the prevalence and pattern of bone metastases in our context is essential for adapting diagnostic and therapeutic strategies to local realities.This study therefore aimed to describe the prevalence and clinicopathological profile of bone metastases among cancer patients treated at Treichville University Hospital.

Materials and Methods

Study Design and Setting

A retrospective descriptive cross-sectional study was conducted in the Oncology Department of Treichville University Hospital, Abidjan, Côte d'Ivoire, from January 1, 2019, to December 31, 2023 (5 years).

Inclusion Criteria

Patients were included if they :

- were aged ≥18 years;

- had a histologically confirmed malignancy;

- had at least one radiologically confirmed bone metastasis;

- presented with or without a skeletal-related event (SRE) such as pathological fracture, spinal cord compression, hypercalcemia, or pain requiring radiotherapy.

Exclusion Criteria

Patients were excluded if:

- they did not provide consent for data use, or

- their medical records were incomplete.

Data Collection and Variables

Data were obtained from medical, consultation, and tumor board records using a standardized and anonymized collection for-

m.Variables included:

- Sociodemographic data (age, sex, socioeconomic status, comorbidities),

- Clinical data (primary tumor site, symptoms, skeletal-related events),

- Radiological data (type of imaging, localization, number and nature of lesions).

Statistical Analysis

Data were analyzed using SPSS 12.0.Quantitative variables were expressed as means ± standard deviation, and qualitative variables as frequencies and percentages.Prevalence was calculated as the proportion of patients with bone metastases among all metastatic cancer cases.

Results

Frequency of Bone Metastases by Primary Organ

Among the 917 patients with metastatic cancer managed during the study period, 358 (39.04%) presented with at least one secondary bone lesion. Bone metastases were more frequent in osteophilic cancers, particularly prostate (80%), lung (63%), thyroid (64%), and breast cancer (38%). They also occurred at noteworthy rates in digestive tract cancers (Table 1).

Table 1: Frequency of Bone Metastases by Primary Organ

Primary site	Total cases (N)	Cases with bone metastases (n)	Percentage
Breast	264	101	38/26%
Lung	65	41	63.08%
Prostate	119	94	78.99%
Thyroid	11	7	63.63%
Testis	7	2	28.57%
liver	72	37	51.39%
Cervix uteri	94	3	3.22%
Soft tissu	31	1	3.19%
Œsophagus	22	7	31.81%
Stomach	46	5	10.87%
Colon	68	27	39.71%
Anal margin	14	4	28.57%
Ovary	35	11	31.43%
Head and Neck	43	4	9.30%
Kidney	11	5	45.45%
Unknown primary	15	9	60.00%

Distribution of Patients According to Sociodemographic Characteristics

Among the 358 cases, the distribution by sex was nearly equal, with a sex ratio of 1.01. The patients' ages ranged from 21 to 86 years, with a mean age of 47.76 ± 8.6 years. The most affected age groups were 36–50 years (37.43%) and 51–65 years (25.42%).The main medical comorbidities included hypertension (12.4%), diabetes mellitus (9%), and viral hepatitis B or C (3%). A low socioeconomic level was reported in 51.98% of patients (Table 2).

Table 2: Distribution of Patients According to Sociodemographic Characteristics

Parameters	Number	Percentage (%)
Age group (N = 358)		
21-35 years	53	14.8
36-50 years	134	37.43
51-65 years	91	25.42
> 65 years	80	22.35
Sex (N=358)		
Male	180	50.28
Female	178	49.72
Socioeconomic level (N=277)		
Low	144	51.98
Intermadiate	88	31.77
High	45	16.25
Comorbidities	39	10.89
Hypertension		
Diabetes mellitus	25	6.98
HIV infection	11	3.07
Lifestyle risk factors (N= 305)		
Alcohol consumption	54	17.7
Tabacco use	38	12.46

Distribution of Patients According to Primary Tumor Site and Sex

The primary tumor site was known in almost all cases. The most common primaries associated with bone metastases were breast cancer (28.21%), prostate cancer (26.26%), and lung cancer (14.25%). The primary site was unknown in 9 patients (2.5%) (Table 3).Bone metastases were most often diagnosed concomitantly with the primary tumor in 75.98% of cases (Figure 1).
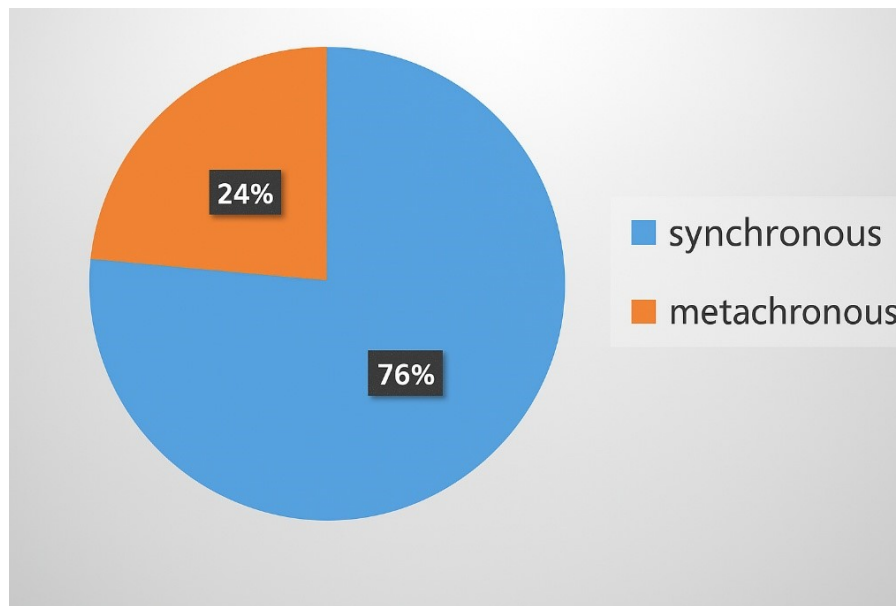
Figure 1: Synchronous and Metachronous Characteristics of Bone Metastases

Table 3: Distribution of Patients According to Primary Tumor Site and Sex

Primary Tumor Site	Male	Female	Total cases (n)	Percentage
Breast	3	103	106	29.61%
Prostate	99	0	99	27.65%
Lung	29	22	51	14.25%
Colon	16	11	27	7.54%
Stomach	9	8	17	4.75%
Ovary	0	11	11	3.07%
Thyroid	3	4	7	1.95%
Oesophagus	4	3	7	1.95%
Kidney	3	2	5	1.40%
Liver	3	2	5	1.40%
Anal margin	1	3	4	1.12%
Head and Neck	3	1	4	1.12%
Cervix uteri	0	3	3	0.84%
Testis	2	0	2	0.56%
Soft Tissu	0	1	1	0.28%
Unknown primary	5	4	9	2.41%

Distribution of Bone Metastases According to Site and Sex

The spinal column was the most frequently affected site, accounting for 161 cases (44.97%). Diffuse bone involvement was observed in 28.77% of cases (Table 4).

Table 4: Distribution of Bone Metastases According to Site and Sex

Bone Site	Male	Female	Number	Percentage
Vertebrae	88	73	161	44.97%
Pelvis	23	12	35	9.78%
Fémur	10	11	21	5.87%
Humérus	4	9	15	4.19%
Ribs	8	6	14	3.91%
Others	4	5	9	2.51%
Disseminated	43	60	103	28.77%

Distribution of Metastases According to Imaging Technique and Type of Lesions

Bone lesions were mainly identified by computed tomography (CT) in 56.15% of patients, followed by magnetic resonance imaging (MRI) in 19.27%.Histologically, the secondary bone lesions were predominantly osteolytic (68.92%) (Table 5).Lesions were multiple in 91% of patients (Figure 2).
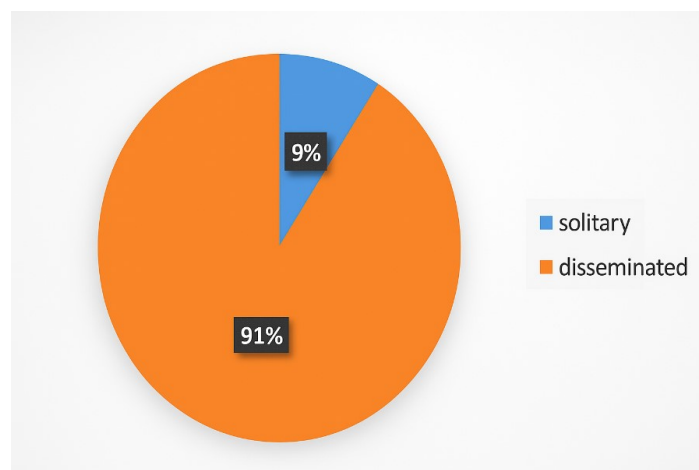
Figure 2: Solitary or Multiple Characteristics of Bone Lesions

Table 5: Distribution of Metastases According to Imaging Technique and Type of Lesions

Variable	Number	Percentage
Imaging Technique (N=358)		
Standard X-ray	28	7.82%
CT scan	201	56.15%
MRI	69	19.27%
Bone scintigraphy	57	15.92%
PET scan	3	0.84%
Type of Lesion		
Osteoblastic (sclerotic)	37	10.34%
Osteolytic	246	68.71%
Mixed	75	20.95%

Distribution of Patients According to Skeletal-Related Events (SREs)

Skeletal-related events (SREs) were documented in 61.38% of patients. The most frequent manifestations were bone pain (63.85%), spinal cord compression (24.41%), and pathologic fractures (11.74%). Among the 194 patients who had serum calcium measurements, levels were generally within normal limits but were elevated in 26.29% of cases (Table 6). Bone metastases were frequently associated with other secondary localizations, notably pulmonary (26.03%), hepatic (21.92%), lymph node (18.72%), and cerebral metastases (2.74%) (Table 6).

Table 6: Distribution of Patients According to Skeletal-Related Events (SREs)

Clinical Manifestations	Number	Percentage
Pain	136	63.85%
Pathological fracture	25	11.74%
Spinal cord compression	52	24.41%

Table 7: Distribution of Patients According to Associated Metastases

Associated metastases	Number	Percentage
Lung	57	26.03%
Liver	48	21.92%
Node	41	18.72%
Brain	6	2.74%
Disseminated	56	25.57%
Others	11	5.02%

Discussion

Study Limitations

- **Selection Bias:** The patient sample may not be fully representative of the general population of cancers patients.

- **Incomplete Data:** The quality of the analysis may have been affected by the completeness and accuracy of the available medical records.

In our setting, cancer is often diagnosed at an advanced or metastatic stage [12]. This descriptive study made it possible to estimate the prevalence and describe the clinical characteristics of bone metastases from solid tumors in adults in Côte d'Ivoire.

In this study, the prevalence of secondary bone lesions was comparable to that reported in the literature. Indeed, bone metastases are found in approximately 20–35% of cancers patients at diagnosis or during the course of the disease, as reported by Coleman R.E. in the United States and Kim Jae-Do in Japan [1, 2, 10]. Although osteophilic cancers account for the majority of bone metastases, any malignancy can potentially lead to skeletal involvement.

Bone metastases were particularly more frequent among patients under 50 years of age in our cohort. The mean age of our population was lower than those reported in Asian and Western series [1, 10], which could be explained by the sociodemographic characteristics of our population. In low- and middle-income countries, the population tends to be relatively young.

In our series, the gender distribution was almost equal, in contrast to most Western studies that report a clear male predominance [1, 10, 11]. This may reflect a higher rate of bone metastases among female patients in our context.

The predominance of patients with low socioeconomic status observed in this study is consistent with findings from other Sub--Saharan African series, including Côte d'Ivoire [12]. This can be attributed to the generally low socioeconomic conditions prevailing in many African settings.

Cancers of the prostate, breast, and lung accounted for nearly 70% of the primary tumors responsible for bone metastases in our study. According to the literature, these primary sites, along with thyroid and kidney cancers, are responsible for approximately 80% of metastatic bone disease [4, 5, 13]. This predominance reflects both their high incidence and their strong affinity for bone tissue.

In our series, secondary bone lesions most commonly involved the vertebrae — a finding consistent with numerous reports in the literature [11, 13]. The lesions were multiple in most cases, as observed in other studies.

Pain was the most frequent clinical manifestation of bone metastases [2, 13, 14], occurring in 63.84% of our patients. Pain typically precedes the onset of pathological fractures. According to Jaffe and Fidler, pathological fractures occur only when more than 50% of the cortical bone has been destroyed [2, 14]. In our study, 27% of patients presented with pathological fractures. Moreover, spinal cord compression was observed in 25% of cases, compared to approximately 10% in Western series [2, 11, 13]. This high rate may be related to delays in the diagnosis and management of vertebral metastases, increasing the risk of neurological complications [12].

Hypercalcemia is reported in 10–35% of cancers patients [13]. Our study found a 26.29% prevalence of hypercalcemia among patients with skeletal metastases, which is consistent with previously published data.

Conclusion

This study provided valuable insight into the distribution and clinical characteristics of this serious cancer-related complication. The results demonstrate a significant proportion of bone metastases among patients with advanced cancers in a relatively young hospital population. In this cohort, breast, prostate, and lung cancers were the most common primary sites associated with bone metastases. These skeletal lesions predominantly affected the axial skeleton and produced diverse clinical symptoms depending on the site and extent of disease.

The findings are consistent with international data, reinforcing the relevance of these results for local clinical practice. However, a multicenter analytical study would be necessary to better identify prognostic factors and optimize management strategies for patients with bone metastases.

Ethical Approval

Written informed consent was obtained from all patients included in the study.

Author Contributions

Toure M. conceived the study. Mebaiala N.M.P. collected patient data from medical records and drafted the manuscript. All authors reviewed and approved the final version for submission.

Data Availability

The datasets used and/or analyzed during the current study are available from the corresponding author upon reasonable request.

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Conflict of Interest

The authors declare no conflict of interest

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