

Epidemiology, Management and Outcomes of Primary Bone Sarcomas in a Moroccan Tertiary Cancer Center: A Retrospective Study

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Abstract

Background: Primary bone sarcomas are rare malignant tumors with significant morbidity and mortality. Data from African settings remain limited, particularly regarding diagnostic delays and access to multidisciplinary care. This study aimed to describe the epidemiological, clinical, therapeutic, and outcome characteristics of patients with bone sarcomas treated in a Moroccan tertiary cancer center. **Methods:** We conducted a retrospective descriptive study including patients with histologically confirmed primary malignant bone sarcoma treated between January 2018 and December 2020 at the Mohammed VI Center for Cancer Treatment, Casablanca. Data were extracted from medical records and analyzed using SPSS software. Overall survival was estimated using the Kaplan-Meier method. **Results:** A total of 94 patients were included, representing 0.85% of all cancers treated during the study period. The median age was 28 years, with a male predominance (58.5%). The mean diagnostic delay was 8.6 months. Osteosarcoma was the most frequent histological subtype (52.1%), followed by Ewing sarcoma (23.4%) and chondrosarcoma (12.8%). Lower limb involvement was predominant (59.6%). Only 23.4% of patients were discussed in a multidisciplinary tumor board. At last follow-up, 41.5% of patients were lost to follow-up. The estimated overall survival at 56 months was 68%, although interpretation is limited due to the high rate of censored data. **Conclusion:** Bone sarcomas in our setting are characterized by delayed diagnosis, limited multidisciplinary management, and high loss to follow-up. These factors represent major barriers to optimal outcomes. Strengthening early diagnosis pathways and structured sarcoma care is essential.

Keywords

Bone Sarcoma, Osteosarcoma, Epidemiology, Africa, Diagnostic Delay, Survival, Multidisciplinary Care

1. Introduction

Primary bone sarcomas are rare malignant tumors arising from mesenchymal tissues, accounting for less than 0.2% of all cancers worldwide [1]. They predominantly affect children, adolescents, and young adults [2]. Osteosarcoma and Ewing sarcoma are representing the most common histological subtypes [3].

Despite advances in multimodal treatment strategies, including surgery, chemotherapy, and radiotherapy. Survival outcomes remain heterogeneous and strongly influenced by early diagnosis and access to specialized care. In high-income countries, improvements in diagnostic pathways and multidisciplinary management have significantly enhanced survival rates [4]-[6].

In contrast, in low- and middle-income countries (LMICs), including many African settings, delayed diagnosis, limited access to imaging and pathology, and suboptimal referral systems contribute to poorer outcomes [7] [8]. Furthermore, data on bone sarcomas in Africa remain scarce, often limited to small retrospective series.

This study aimed to describe the epidemiological, clinical, therapeutic, and outcome characteristics of patients with primary bone sarcomas treated in a Moroccan tertiary cancer center, with a particular focus on diagnostic delays and healthcare system challenges.

2. Methods

2.1. Study Design and Setting

This retrospective descriptive study was conducted at the Mohammed VI Center for Cancer Treatment, part of the Ibn Rochd University Hospital in Casablanca, Morocco. It is the first cancer treatment center in Morocco.

2.2. Study Population

We included all patients with histologically confirmed primary malignant bone sarcoma treated between January 1, 2018 and December 31, 2020.

Exclusion criteria: soft tissue sarcomas, visceral sarcomas, non-malignant bone tumors.

2.3. Data Collection

Data were extracted from electronic medical records and included:

- sociodemographic characteristics
- clinical presentation
- medical history

- tumor localization and histology
- Diagnostic and treatment delays treatment modalities
- outcomes

2.4. Definitions

- 1) Diagnostic delay: time from first clinical symptom to histological diagnosis.
- 2) Treatment delay: time from diagnosis to initiation of first treatment.

2.5. Statistical Analysis

Data were analyzed using SPSS software. Descriptive statistics were used to summarize patient characteristics.

Overall survival (OS) was estimated using the Kaplan-Meier method. Patients lost to follow-up were censored at the date of last contact.

3. Results

3.1. Patient Characteristics

A total of 94 patients were included, representing 0.85% of all cancers treated during the study period. The median age was 28 years (range: 8 - 87), with a male predominance (58.5%; sex ratio 1.41). Most patients (57.4%) were from urban areas. Only 17% had health insurance coverage.

3.2. Medical History

No patients had a history of genetic syndromes such as neurofibromatosis, retinoblastoma, or Paget’s disease. A minority had personal or familial cancer history (Figure 1).

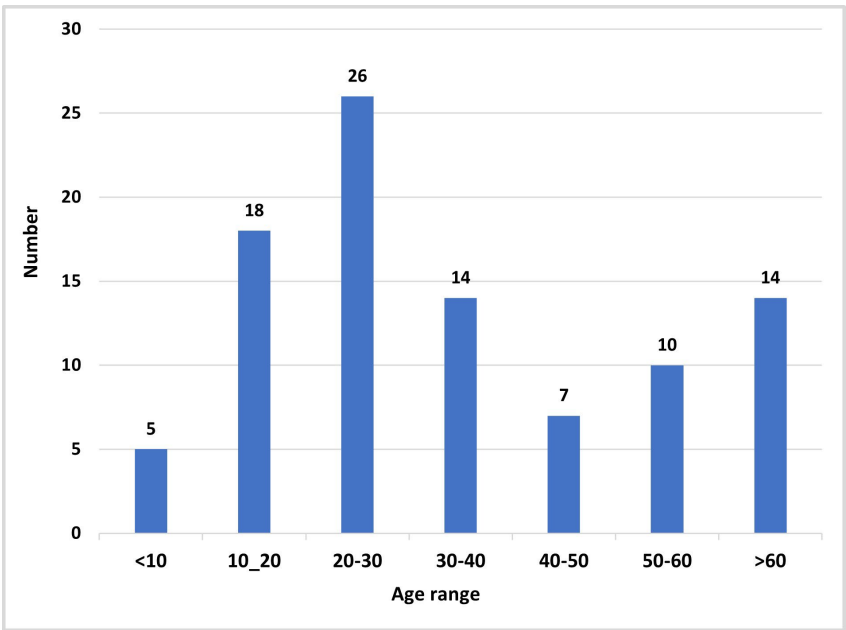


Figure 1. Distribution of bone sarcomas by age group.

3.3. Diagnostic and Treatment Delays

The mean diagnostic delay was 8.6 months. Most patients (75.5%) were diagnosed within 12 months after symptom onset. The mean treatment delay was 2.57 months, with 70.2% of patients initiating treatment within 4 months. Only 23.4% of patients were discussed in a multidisciplinary tumor board (**Table 1**).

Table 1. Distribution of bone sarcoma cases according to the time to diagnosis.

Diagnostic time	Number of cases	Percentage %
0 - 2 months	7	7.4
2 to 4 months	29	30.9
4 to 6 months	7	7.4
6 to 12 months	28	29.8
>12 months	9	9.6
Not specified	14	14.9

The average time to treatment (time between diagnosis and first treatment) was 2.57. With 70.2% of patients having started their treatment before a delay of 4 months (**Table 2**).

Table 2. Distribution of bone sarcoma cases according to the time frame for treatment.

Treatment processing time	Number of cases	Percentage %
0 - 2 months	35	37.2
2 to 4 months	31	33
4 to 6 months	7	7.4
6 to 12 months	3	3.2
>12 months	1	1.1
Not specified	17	18.1

3.4. Tumor Characteristics

The most common tumor location was the lower limb (59.6%), particularly the femur (28.7%) and tibia (22.3%). Pelvic involvement was observed in 13.8% of cases. Osteosarcoma was the most frequent histological subtype (52.1%), followed by Ewing sarcoma (23.4%) and chondrosarcoma (12.8%).

3.5. Treatment Modalities

Chemotherapy was administered to 70 patients, while 30 patients received radiotherapy.

Surgical treatment was performed in 48 patients: limb-sparing surgery: 65% versus amputation: 35%.

3.6. Outcomes

At last follow-up:

- 4.2% achieved complete remission
- 43.6% were alive with disease
- 41.5% were lost to follow-up
- 11.7% had died

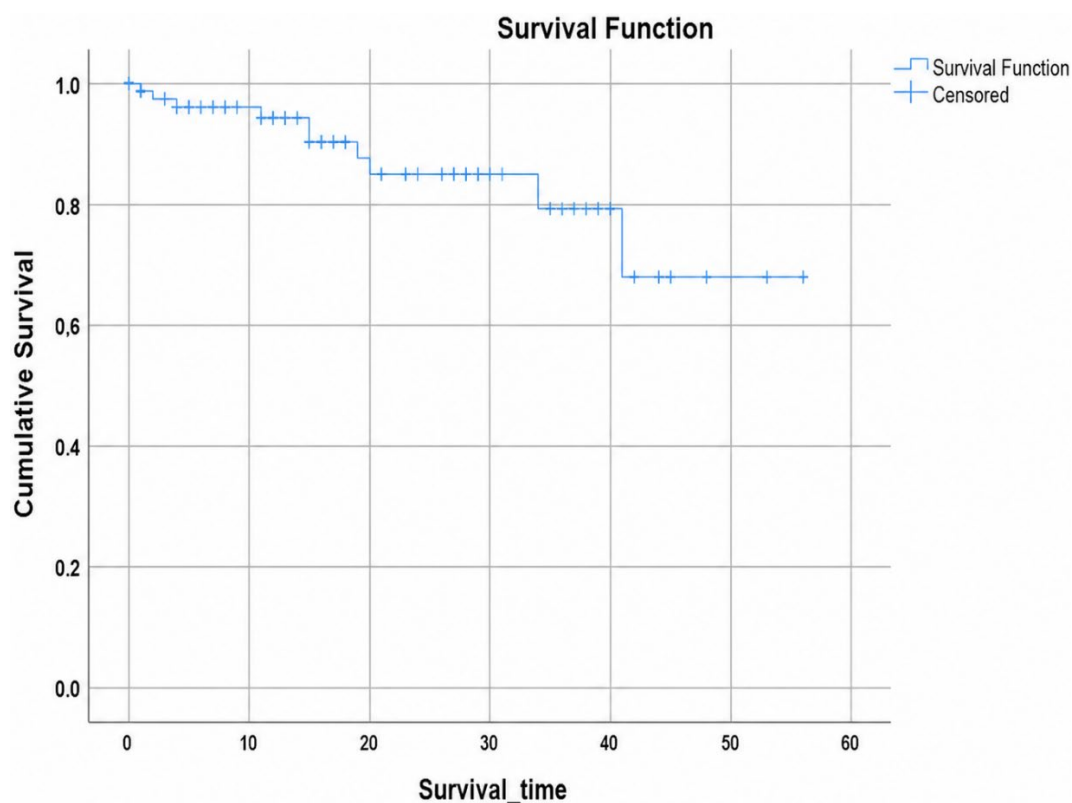


Figure 2. Survival curve for bone sarcomas.

The median follow-up duration could not be reliably estimated due to the high proportion of patients lost to follow-up. The estimated overall survival at 56 months was 68%. However, this result should be interpreted with caution due to the high proportion of censored data related to loss to follow-up (**Figure 2**).

4. Discussion

This study provides insight into the epidemiological and clinical characteristics of bone sarcomas in a Moroccan tertiary care setting. The proportion of bone sarcomas observed (0.85%) is consistent with other hospital-based African studies [7] [9] but higher than population-based registry estimates [10], likely reflecting referral bias.

The age distribution and predominance of osteosarcoma are in line with data from other African and Middle Eastern populations [7] [8] [11], which tend to be younger compared to Western populations [12] [13].

A key finding of this study is the prolonged diagnostic delay (8.6 months), significantly longer than reported in high-income countries: 3.9 months in United Kingdom [14] and 1 month in Netherlands [15]. This delay likely reflects systemic barriers, including limited access to advanced imaging, delayed referral pathways, and challenges in obtaining histopathological diagnosis.

We need to make an effort to reduce this delay by raising greater awareness among general practitioners and specialists regarding the clinical signs and diagnostic methods for bone sarcomas.

According to 2021 data from the US National Cancer Database, patients with a prolonged time to treatment initiation had lower overall survival compared to those with a delay of 30 days or less [16]. In the Casablanca region, the time to treatment initiation is twice as long as reported in the literature [17]. In our setting, this is attributed to difficulties in accessing histopathological analysis and staging workups, even though oncological treatment begins within the same week the patient is discussed by the sarcoma multidisciplinary team. With the expansion of medical coverage in Morocco, this time to treatment initiation could align with the figures found in the literature.

Another important observation is the low rate of multidisciplinary tumor board discussion, which is a cornerstone of sarcoma management. Discussing patient cases during Multidisciplinary Team (MDT) meetings is crucial for the quality of care. According to Ke Pang *et al.*, in a series published in 2022 [18], MDT discussions increased the diagnostic accuracy for bone sarcomas to 95.42%. A European study in 2020 found that 84% of participating centers held a local multidisciplinary meeting once a week, discussing between 4 and 40 bone sarcoma cases (median: 15 cases) [19]. In our series, only one in four patients is discussed at the weekly sarcoma MDT meeting. This percentage is low, given that an average of 10 all sarcoma cases are discussed at the MDT meeting each week. This rate may be explained by the fact that cases discussed prior to diagnosis and management in the trauma department are not documented in the patient management IT system at the Mohammed VI Cancer Treatment Center. It is possible that oncologists only discuss cases involving issues such as reoperation or a change in therapeutic strategy. Strengthening multidisciplinary care pathways is essential to improve outcomes.

The clinical course in our series is characterized by a low rate of complete remission and a high number of patients lost to follow-up. The high rate of loss to follow-up (41.5%) represents a major limitation and reflects structural healthcare challenges, including financial constraints, geographic barriers, and limited patient tracking systems. This significantly impacts the accuracy of survival estimates.

Survival among patients with bone sarcoma is better in developed countries. In Europe, the 5-year relative survival rate for bone sarcomas during the 2000-2002 period was 62% [6]. In Australia, between 2012 and 2016, the 5-year relative survival rate was 71% [12]. A study conducted at Balgrist University Hospital in Zur-

ich, Switzerland, found a 5-year survival rate of 74% for osteosarcoma, 85% for Ewing sarcoma, and 86% for chondrosarcoma [20]. In our series, mean survival was 46.57 months, and the cumulative survival rate at 56 months was 68%. The high loss to follow-up (41.5%) represents a major limitation and may lead to over-estimation of survival outcomes.

Despite these limitations, the observed survival rate appears comparable to some international series; however, caution is warranted in interpretation. Improving early-stage diagnosis would lead to better survival rates.

5. Study Limitations

The limits of our study are the following characters:

- Retrospective single-center design
- High rate of loss to follow-up
- Lack of multivariate prognostic analysis
- Potential selection bias

6. Conclusion

Bone sarcomas in our setting are characterized by: delayed diagnosis, limited multidisciplinary management, high loss to follow-up. Improving early detection, optimizing referral systems, and ensuring systematic multidisciplinary management are essential to improve patient outcomes. Future research should focus on multicenter prospective studies and the development of national sarcoma registries.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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