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S Tinto
Centre Hospitalier Universitaire Yalgado Ouédraogo, Ouagadougou, Burkina Faso

I Ouedraogo
Centre Hospitalier Universitaire Régional de Ouahigouya, Burkina Faso

MN Dabire
Hôpital Saint Camille De Ouagadougou, Burkina Faso

AS Korsaga
Centre Hospitalier Universitaire Yalgado Ouédraogo, Ouagadougou, Burkina Faso

AJI Ouedraogo
Centre Hospitalier Universitaire De Bogodogo, Ouagadougou, Burkina Faso

M Sawadogo
Centre Hospitalier Universitaire Yalgado Ouédraogo, Ouagadougou, Burkina Faso

M Tall
Centre Hospitalier Universitaire De Bogodogo, Ouagadougou, Burkina Faso

PHW Dakoure
Centre Hospitalier Universitaire De Souro SANOU, Bobo Dioulasso, Burkina Faso

Corresponding Author:
I Ouedraogo
Centre Hospitalier Universitaire Régional de Ouahigouya, Burkina Faso

Malignant bone tumors: Diagnostic, therapeutic and evolutionary aspects in precarious environments

S Tinto, I Ouedraogo, MN Dabire, AS Korsaga, AJI Ouedraogo, M Sawadogo, M Tall and PHW Dakoure

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Abstract
Malignant bone tumors are rare, but they are high-grade tumors with a direct impact on the functional prognosis of the affected limb and the patient's vital prognosis. They constitute a diagnostic and therapeutic emergency. The aim of this study is to review the diagnostic and therapeutic particularities of these tumors in precarious environments.
This was a descriptive and analytical cross-sectional study with retrospective data collection covering a five-year period from 1 January 2019 to 31 December 2024.
We identified 42 cases of bone tumors, representing 0.12% of the reasons for hospitalization. Of these, 31 met our inclusion criteria. The mean age of the patients was 30.45 years. Males predominated, with a sex ratio of 1.21. The femur and tibia were the preferred sites, accounting for 51.61% (n=16) and 22.58% (n=7) of cases respectively. Osteosarcoma was the most frequent histological type (70.97%), followed by chondrosarcoma and fibrosarcoma. The most common clinical signs were pain and swelling (100%). Lung metastases were found in 15 cases. Chemotherapy was administered in 5 patients. Surgical treatment was performed in 24 patients, including 15 amputations. Our study shows that malignant bone tumors are a rare but serious lesion in resource-limited countries, where diagnosis is usually delayed.

Keywords: Bone tumor, malignant, diagnosis, treatment, survivorship

Introduction
Malignant bone tumours are defined by the World Health Organisation (WHO) as any malignant tumour proliferation originating in the bone [1]. Ces tumeurs sont peu courantes et représentent environ 11% de l'ensemble des tumeurs avec une variabilité de leur incidence selon l'âge [2]. Malignant bone tumours are therefore rare, but they are high-grade tumours that directly affect the functional prognosis of the affected limb and the patient's vital prognosis. They therefore constitute a diagnostic and therapeutic emergency [3]. They are the second most common cause of death after cardiovascular disease, and bone remains the third most common site for tumours after the liver and lungs [4]. However, although the number of malignant bone tumours is very small, the WHO lists more than 20 different types. Osteosarcoma, chondrosarcoma and Ewing's sarcoma are the three most common types of malignant bone tumour [5]. These conditions pose diagnostic problems because of their rarity, their aetiology and the permanent changes in their bone tissue, characterised by a succession of osteoclastic and osteoblastic phases [6]. The circumstances in which certain tumours are discovered, in the case of tumours revealed by pathological fractures. Their semiology is not explicit. Imaging is an essential part of the diagnostic process, but cannot be used to confirm the diagnosis. Biopsy is the fundamental step in the diagnostic process, and diagnostic confirmation is based essentially on anatomopathological examination of the excised specimen [7].
Their often non-specific clinical presentation does not make them easy to recognise. What's more, in our environment, where patients consult late, planning their care remains a challenge for practitioners.
The aim of this study was to analyse the epidemiological, diagnostic and therapeutic aspects of these tumours in our centre, in order to improve their management.

Materials and Methods

This was a cross-sectional, descriptive and analytical study with retrospective data collection carried out at the Yalgado OUEDRAOGO University Hospital over a period of 6 years, from 1 January 2019 to 31 December 2024. It covered patients of both sexes aged at least 15 years admitted for bone tumours. Only patients with malignant tumours who had at least radiographic check-ups and a usable file during the study period were included. Patients with malignant bone tumours other than those of the musculoskeletal system were not included. The various data were collected from patients' clinical records, emergency room admission registers and using a specially designed data collection form. The variables studied were: the patient's age, sex, origin, profession, consultation time, nature of the lesions, data on the type of tumour, site, presence or absence of metastases, radiographic signs, therapeutic itinerary, type of treatment (symptomatic, curative, multidisciplinary or not) and five-year survival. General condition was assessed using the WHO performance status score (table 1).

Table 1: WHO performance status [8]

Score	Description
0	Fully active, able to carry out the same pre-morbid activities without restriction
1	Limited physical activity, but ambulatory and able to carry out light or sedentary activities, e.g. light housework or administrative tasks
2	Ambulatory and able to care for himself, but unable to carry out activities. Standing > 50% of the day
3	Able to provide limited care, bedridden or in a wheelchair > 50% of the day
4	Completely disabled, unable to look after himself. Totally confined to bed or a wheelchair

On the basis of radiographic images, tumours were classified as osteolytic, osteocondensing or mixed; the cortices were either intact, blown or ruptured. In the case of periosteal reaction, it was classified as lamellar, spiculated, sunburst, grass fire, onion bulb, spur, Codmann's triangle. Osteolysis lesions have been classified according to Lodwick [9] into 3 types:

Type I (Geographic)

- **IA:** Well-limited lesion with peripheral condensation (sclerosis), suggesting a slow and often benign course.
- **IB:** Well-limited lesion with clear contours, but without a condensation line.
- **Type II (moth-eaten):** Lesion with ill-defined contours, giving a 'mitted' appearance to the bone, often associated with faster growth
- **Type III (Permeative):** Very poorly limited lesion, with significant bone destruction and an infiltrative appearance, often characteristic of an aggressive and potentially malignant lesion**.**

After extension assessment, the tumours were classified as metastatic or non-metastatic. Following clinical and paraclinical assessment, the TNM classification was used to determine the stage of the tumour, based on its size (T), lymph node involvement (N) and metastases (M).

Statistical analysis

The data collected were entered into a computer and analysed using Epi info software version 7.2.1.0 in its French version. The graphs were produced using Microsoft Excel 2016 and the text was entered into Microsoft Word 2016.

Statistical method

The sample was described using standard descriptive statistics. Proportions were used for qualitative variables. Quantitative variables were summarised by the mean and standard deviation when the distribution was normal, and by the median followed by the minimum and maximum for skewed distributions

Ethical considerations

This study was conducted in compliance with the protocol of good clinical practice and the principles of the Declaration of Helsinki. The anonymity of the data collection forms and the confidentiality of the information were respected. In fact, neither the surname nor the first name used to identify the patients appeared on the data collection form. The confidentiality of all the information collected was preserved. Patient consent has been obtained.

Results

1. Socio-demographic aspects

Over a period of 6 years, we recorded 42 cases of primary malignant bone tumours of the musculoskeletal system, representing 0.12% of the reasons for admission. The mean age of patients was 30.45 years, with extremes of 16 and 60 years. Patients in the 15 to 20 age group accounted for 32.26% of cases (figure 1). The series included 17 male and 14 female patients, giving a sex ratio of 1.21. Pupils and students accounted for 32.26% of cases (n=10), while housewives, shopkeepers, farmers and stockbreeders each accounted for 16.13% of cases (n=5)

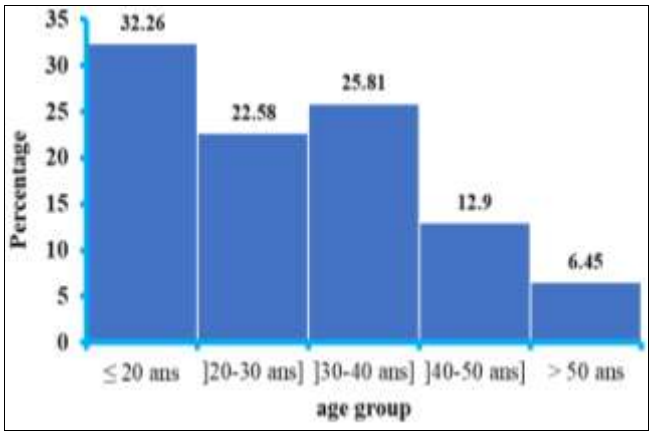

Fig 1: Breakdown of patients by age (n=31).

Lesional aspects

Pain and swelling (Figure 2) were the reason for consultation in all patients. They were associated with deformities in 9 cases, abnormal mobility in 1 case. In 25.80% of cases (n=8), patients had spent a long time with a number of traditional practitioners before turning to modern medicine. A family history of tumour was found in 5 cases. On admission, general condition was preserved (stage 0 and 1) in 1 case; weight loss was reported in 19 patients (table 2). The right side was affected in 17 cases (54.84%) and the left side in 14 cases (45.16%). Adenopathy was found in 25 patients (80.64% of cases) (Table 3).

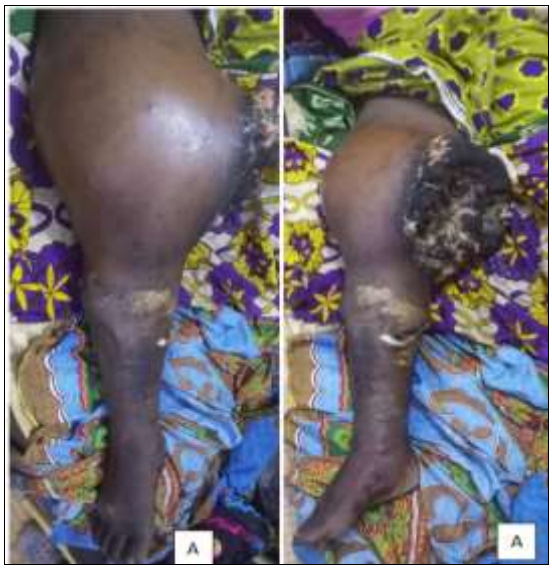

Fig 2: Photograph showing a large non-traumatic knee (A) with an ulcerating tumour covered with traditional products (B)

Table 2: Distribution of patients according to general examination data

General examination	Workforce	Percentage (%)
General condition		
Good condition	1	3,23
Fairly good condition	22	70,97
General condition Poor	8	25,81
Weight loss	19	61,29
Asthenia	26	83,87
Anorexia	21	67,74
Conjunctival pallor	25	19,35
Limb oedema	2	6,45

Table 3: Breakdown of patients by site of adenopathy

Characteristic of the tumor	Workforce	Percentage
Présence d'adénopathie	25	80,65
Adénopathie axillaire	4	12,90
Adénopathie inguinale	19	61,29
Adénopathie cervicale	1	3,23
Ganglion de troisier	1	3,23

Standard radiography was performed in 100% of cases, showing tumours localised to the femur and tibia in 51.61% (n=16) and 22.58% (n=7) of cases respectively. ¬ Metaphyseal tumours accounted for 64.52% of cases (n=20) (Figure 3). Une cortical rupture was found in 26 cases. ¬La cortical was blown in 5 cases. Les tumours were mixed (both osteolytic and osteocondensing) in 27 cases (table 4). The periosteal reaction was honeycomb in 10 cases, spiculated in 6 cases and grass fire in 3 cases. The radioclinical findings were suspicious of osteosarcoma in 16 cases.

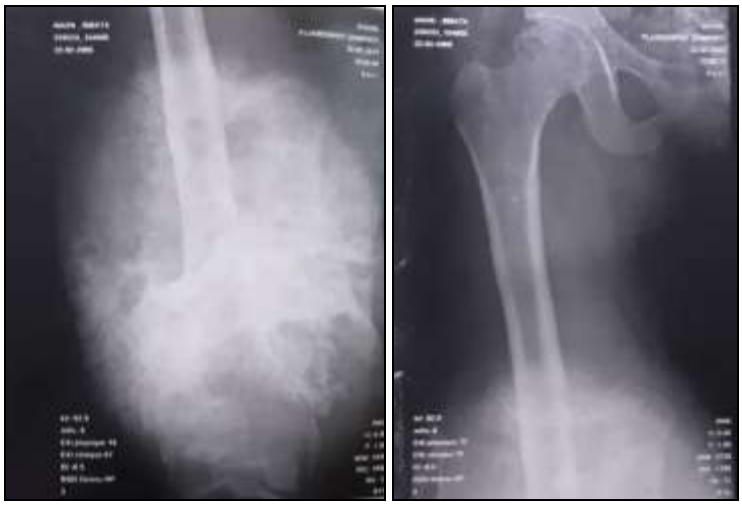

Fig 3: Frontal X-ray of the right knee (A) and thigh (B) showing osteolysis, osteocondensation and metaphyseal-diaphyseal periosteal reaction of the distal right femur of the patient shown above.

Table 4: Breakdown of cases according to structural modifications

Modifications	Workforce	Percentage (%)
Osteolysis Complete	19	61,29
Type I (Geographic)	3	9,68
Geographic IA	2	6,45
Geographic IB	1	3,23
Type II (Moth-eaten)	8	25,81
Ponctuated	3	9,68
Bone condensation		
Absent	4	12,90
heterogeneous	25	80,65
Homogenous	2	6,45

CT scans were performed in 29 cases. Lung and liver metastases were found in 15 and 4 cases respectively.

In terms of the biological work-up, we found anaemia in 26 cases and hyperleukocytosis in 13 cases.

The histological diagnosis of osteosarcoma was made in 70.97% of cases (n=22) (Figure 3). Biopsies were performed in 12 patients. In 19 cases, the anatomopathological study was carried out after clean amputation.

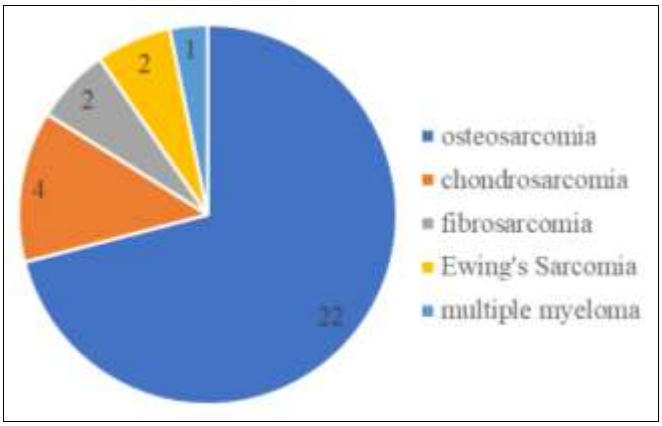

Fig 3: Distribution of patients by histological type of tumour (n=31)

Therapeutic and developmental aspects

Five patients received chemotherapy, including 3 cases of adjuvant chemotherapy and 2 cases of neoadjuvant chemotherapy. Analgesic treatment consisted of paracetamol and tramadol in all patients. Six patients were on morphine. Surgical treatment was performed in 74.19% of cases (n=23) and surgical abstention in 8 cases. Surgical treatment included amputation in 18 cases and disarticulation in 2 cases. An exeresis + cementoplasty was performed in 3 cases.

The average post-operative hospital stay was 8.43+/-5.36 days, with extremes of 3 and 24 days. At a mean follow-up of 28 months, 22 patients died, representing 70.96% of the series.

Discussion

Like our series, other studies report a low hospital frequency of malignant bone tumours in Africa [10, 11]. This frequency may not reflect the true extent of the phenomenon, given the omnipresence and omnipotence of traditional medicine in our countries. This medicine is the first port of call for many social strata for financial, cultural and cultural reasons. Malignant bone tumours appear to be more common in the West, where tumours are the second most common cause of death after cardiovascular diseases [12]. The socio-demographic characteristics of our sample echo those of previous African series, reporting a predominance of young male subjects [10, 11, 13]. Low- and middle-income countries are characterised by late consultation, and therefore diagnosis at the stage of complications and serious deterioration in general condition. At this stage, pain and swelling are the lesser evil [10]. In some cases, pathological fractures are the tell-tale sign of the tumour [10] as was the case for one patient in our series. In addition to the financial problem, difficulties in geographical or security access to referral health structures and reliance on traditional treatment could justify this delay in diagnosis. If behaviour change communication is to be undertaken, it should be added that decentralising more basic social services and referral centres, and making Universal Health Insurance operational, could help to stem the tide. The standard X-ray, which is the most accessible imaging test in a precarious environment, is very revealing in the context of delays in consultation. It frequently reveals a polymorphism of lesions. The majority of our cases were mixed, with a strong predominance of osteolytic lesions, confirming the findings of previous series [10, 14]. The location of bone tumours in the pelvic limbs is a serious factor in terms of the severe functional handicap they cause. However, it was the pelvic limb, first the femur and then the tibia, which was the preferred site for malignant bone tumours in our series, as in many previous series [10, 15]. The presence of metastases is a poor prognostic factor. In our context, it is the consequence of late diagnosis and the cause of the therapeutic dilemma. The treatment of bone tumours, although perfectly codified nowadays, is challenged by the context of delayed diagnosis in which we find ourselves, forcing us to confine ourselves to clean surgery, and histological diagnosis is most often made retrospectively. In our series, osteosarcoma was the most frequent type. Our results are in line with the literature, which states that osteosarcomas are the most common malignant bone tumours in the world, with a high peak between the ages of 15 and 20 and after the age of 60 [1, 2, 10]. Our mortality rate was one of the highest because the study focused on cases of malignant tumours diagnosed and treated late, where the chances of remission are virtually nil.

Conclusion

In short, malignant bone tumours are a rare but serious lesion in developing countries, where diagnosis is often delayed. Young people under 20 and adults aged between 20 and 40 were the most affected, with a predominance of males. Pain and swelling were the main reasons for consultation. All patients underwent a standard X-ray, which was the first-line examination but did not confirm the diagnosis. The malignant tumours encountered in our study were mainly located in the femur and tibia. Osteosarcoma was the most histologically confirmed type. It is followed by chondrosarcoma and fibrosarcoma. Delayed diagnosis, the presence of metastases and the young age of patients seem to constitute the unfortunate triad of malignant bone tumours in precarious environments.

Financing

This is a self-financed study.

Conflict of Interest

The authors declare no conflict of interest in relation to the writing of this article.

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