Abstract

Background: The burden of managing patients with musculoskeletal neoplasms in the West African sub-region is quite significant. This is largely due to late presentation, delay in making diagnosis, and failure of obtaining consent to certain surgical procedures. Improvements in diagnosis and treatment over the years have however increased life and limb survival for many patients. This study was aimed at evaluating the clinicopathologic pattern of neoplasm as it affects the upper and lower limbs with a view to determining the most common types, the most involved sites of the body and the age at presentation of these tumors. Materials and Methods: A total of 65 patients with histologically confirmed neoplasm of the upper and lower limbs arising from bone, cartilage, skeletal muscle, synovium, and tendon sheath were retrospectively selected 7 years from January 2008 to 2015. Results: Forty-one (63.1%) patients were males, whereas 24 (36.9%) were females. Age range is between 5 and 75 years, average of 30.8 years. Lower limb involvement was recorded in 40 (61.5%) patients, with remaining 25 (38.5%) patients in upper limbs. 28 (43.1%) patients had benign lesion, whereas 37 (56.9%) were malignant. Giant cell tumor (GCT) was the most frequent benign tumor (50%) while osteogenic sarcomas top the list on the malignant variety (32.4%). The most commonly affected bones were tibia, carpal-metacarpal, and femur in that order. Conclusion: In our center, GCT and osteogenic sarcoma are the most frequently encountered benign and malignant musculoskeletal extremity neoplasms, respectively, with the tibial bone being most commonly affected.

Keywords: Bone tumors, musculoskeletal neoplasm, pattern

Résumé

Contexte: Le fardeau de la prise en charge des patients atteints de néoplasmes musculo-squelettiques dans la sous-région de l’Afrique de l’Ouest est assez important. C’est en grande partie en raison de la présentation tardive, du retard dans le diagnostic et de l’échec de l’obtention du consentement à certaines procédures chirurgicales. Améliorations dans le diagnostic et le traitement au cours des années ont cependant augmenté la survie de la vie et des membres pour de nombreux patients. Cette étude visait à évaluer le modèle clinicopathologique du néoplasme car il affecte les membres supérieurs et inférieurs en vue de déterminer les types les plus courants, le plus impliquant les sites du corps et l’âge à la présentation de ces tumeurs. Matériaux et méthodes: Au total, 65 patients atteints d’histologie Un néoplasme confirmé des membres supérieurs et inférieurs issus de l’os, du cartilage, du muscle squelettique, de la synovie et de la gaine tendineuse était rétrospectivement Sélectionné 7 ans de janvier 2008 à 2015. Résultats: Quarante et un (63,1%) étaient des hommes, alors que 24 (36,9%) étaient des femmes. Tranche d’âge Est entre 5 et 75 ans, en moyenne de 30,8 ans. L’atteinte des membres inférieurs a été enregistrée chez 40 patients (61,5%), avec 25 (38,5%) restants Patients dans les membres supérieurs. 28 (43,1%) avaient une lésion bénigne, alors que 37 (56,9%) étaient malignes. La tumeur des cellules géantes (GCT) était la plus Tumeur bénigne fréquente (50%), tandis que les sarcomes osseogènes classent la liste sur la variété maligne (32,4%). Les os les plus fréquemment affectés Étaient le tibia, le carpal-métacarpien et le fémur dans cet ordre. Conclusion: Dans notre centre, le GCT et le sarcome ostéogène sont les plus fréquents Ont rencontré des néoplasmes d’extrémités musculo-squelettiques bénignes et malignes, respectivement, l’os tibial étant le plus souvent affecté.

Mots-clés: Tumeurs osseuses, néoplasme musculo-squelettique, motif
INTRODUCTION

Neoplasms of the musculoskeletal system are tumors arising from bone, cartilage, skeletal muscle, synovium, and the tendon sheaths of the upper and lower limbs. These extremity “new growths” constitute a significant cause of morbidity and mortality in orthopedic oncology, particularly in this sub region where a few orthopedic surgeons are overwhelmed by the burden of patients with musculoskeletal trauma and infection. Broadly speaking, these neoplasms are classified as benign or malignant, primary or secondary (metastatic), as well as tumors arising from hard (bone and cartilage) or soft tissue. Technological progress and the ever-increasing understanding of neoplasms make this field one of the most rapidly evolving areas of modern medicine. It has been clearly demonstrated that the success of the outcome of tumor management depends on early diagnosis and multidisciplinary treatment approach.[1,2] Unfortunately, ignorance and cultural beliefs are the main cause of late presentation.[3] even among the few that presents early, are sometimes financially constrained to afford certain definitive limb sparing and reconstructive surgical procedures, particularly when combined with the additional cost of pre- or post-operative chemoradiation. This study and other similar articles on descriptive data and regional distribution of musculoskeletal tumors are useful for public awareness and planning of diagnosis and treatment strategies. The musculoskeletal tumor management protocol in our center include clinical evaluation, biopsy for histological diagnosis often in conjunction with definitive surgical treatment and subsequent referral to radio-oncology unit of the Teaching Hospital for the commencement of chemotherapy, radiotherapy, or a combination of the two where it is appropriate.

MATERIALS AND METHODS

This is a retrospective study of histologically confirmed musculoskeletal neoplasms arising from upper and lower limbs only (shoulder and pelvis inclusive) managed over 7 years period from January 2008 to 2015. Data were retrieved from patients case record and Histology Bench Book of Pathology Department of the tertiary institution. Information of patients as regards the histological type of the musculoskeletal tumor, age of the patient, sex and the site of involvement were extracted and analyzed. Patients record with incomplete data entry that lack any of the above mentioned criteria were excluded from the study. Tumors of the marrow elements and those that arise from skin, fat, blood vessels and nerves were also excluded, on the ground that their treatment were often undertaken primarily by hematologists and general surgeons without necessarily the attention of orthopedic surgeon.

RESULTS

Sixty-five cases were analyzed over the study period. The age range is between 5 and 75 years, average of 31 years. The youngest patient was a 5-year-old boy with alveolar rhabdomyosarcoma (RMS) of the left shoulder. There were two 75-year-old males as oldest patients with histological diagnosis of right tibia low-grade chondrosarcoma and left thigh mass pleomorphic RMS, respectively. Benign musculoskeletal tumors accounted for 28 cases representing 43.1%, whereas malignant musculoskeletal tumors accounted for 37 cases representing 56.9%. Twenty-one patients (75%) with benign neoplasm were below 31 years of age, with a peak frequency in the third decade and then tailed off with increasing age, becoming absent in the age group 61 years and above [Table 1]. Forty-one (63.1%) patients were males, whereas 24 (36.9%) were females with male to female ratio of 1.7:1 [Table 2]. The highest number of malignant cases of ten patients (27%) was in the age range between 11–20. Among benign musculoskeletal tumors distribution [Table 3], giant cell tumor (GCT) was the most common, accounted for 57.1% followed by osteochondroma (21.5%). Further breakdown of the types of malignant musculoskeletal tumors on Table 4 showed that osteosarcoma accounted for the majority (48.6%) followed by RMS (24.4%). Overall, the tibia was the most commonly involved long bone (33.3%). It was followed by the carpometacarpal (15.7%) and the femur (13.7%) [Table 5] with most benign tumors clustering around carpometacarpal bones. Malignant soft tissue tumor was highest in the thigh region (28.7%) followed by the shoulder (21.5%) [Table 6].

DISCUSSION

This retrospective study describes the pattern and frequencies of musculoskeletal tumors histologically evaluated at a tertiary referral center in Nigeria. Most similar studies carried out in the country lay more emphasis on only primary or malignant bone tumors[6-10] the only malignant aspect of musculoskeletal neoplasms[9] or the musculoskeletal tumors in a specific age group.[8] This study included both benign and malignant bone tumors and its intimately related soft tissue envelope from the functional point of view and for all age group. The male preponderance found in this study is similar to other findings both in local[4,7] and international publications.[11,13] The male to female ratio of 1.7:1 found

| Table 1: Distribution of cases of musculoskeletal tumor by age at diagnosis |
|-----------------------------|------------------|------------------|---------|--------|
| Age            | Number of benign cases | Number of malignant cases | Total  | Percentage |
| 0-10          | 1                | 6                | 7       | 10.8    |
| 11-20         | 6                | 10               | 16      | 24.6    |
| 21-30         | 14               | 4                | 18      | 27.7    |
| 31-40         | 4                | 7                | 11      | 16.9    |
| 41-50         | 2                | 4                | 6       | 9.2     |
| 51-60         | 1                | 2                | 3       | 4.6     |
| 61-70         | -                | 2                | 2       | 3.1     |
| 71-above      | -                | 2                | 2       | 3.1     |
| Total (%)     | 28 (43.1)        | 37 (56.9)        | 65      | 100     |
Table 2: Distribution of cases of musculoskeletal tumor by sex at diagnosis

| Tumor          | Male | Female | Total | Ratio |
|----------------|------|--------|-------|-------|
| GCT            | 12   | 4      | 16    |       |
| Osteochondroma | 2    | 4      | 6     |       |
| Enchondroma    | 2    | -      | 2     |       |
| Ossifying fibroma | -    | 1      | 1     |       |
| Osteolipoma    | -    | 1      | 1     |       |
| Osteosarcoma   | 12   | 6      | 18    |       |
| Chondrosarcoma | 3    | 3      | 6     |       |
| RMS            | 5    | 4      | 9     |       |
| Synovial sarcoma | 2    | -      | 2     |       |
| Ewing sarcoma  | 1    | -      | 1     |       |
| Myofibrosarcoma | 1    | 1      | 1     |       |
| **Total (%)**  | 41 (63.1) | 24 (36.9) | 65 (100) | 1.7:1 |

GCT=Giant cell tumor, RMS=Rhabdomyosarcoma

Table 3: Distribution of benign musculoskeletal tumors

| Histologic variety | Frequency (%) |
|--------------------|---------------|
| GCT                | 16 (57.1)     |
| Osteochondroma     | 6 (21.5)      |
| Enchondroma         | 2 (7.1)       |
| Ecchondroma         | 2 (7.1)       |
| Ossifying fibroma   | 1 (3.6)       |
| Osteolipoma         | 1 (3.6)       |
| **Total**           | 28 (100)      |

GCT=Giant cell tumor

Table 4: Distribution of malignant musculoskeletal tumors

| Histologic variety | Frequency (%) |
|--------------------|---------------|
| Osteosarcoma       | 18 (48.6)     |
| Chondrosarcoma     | 6 (16.2)      |
| RMS                | 9 (24.4)      |
| Synovial sarcoma   | 2 (5.4)       |
| Ewing’s sarcoma    | 1 (2.7)       |
| Myofibrosarcoma    | 1 (2.7)       |
| **Total**          | 37 (100)      |

RMS=Rhabdomyosarcoma

coincided with the findings of 1.7:1 by Eyesan et al.[11] but slightly higher than that reported by Oba lum at Lagos University Teaching Hospital[6] and Solooki et al. in Shiraz, south of Iran.[13]

Contrary to expectation, malignant musculoskeletal tumors are higher in number than benign tumors in this study. This is largely due to the addition of nine cases of RMS and one myofibrosarcoma to the 26 total number of primary malignant bone tumors, without which 28 cases of benign tumors would have been marginally higher. Second, most benign soft tissue tumors like lipoma have been excluded on the ground that treatment of such tumors is often undertaken by general surgeons as stated earlier. Similar higher incidence of malignant over benign musculoskeletal tumors, although among pediatric age group, have been reported by Ode Michael at JOS University Teaching Hospital.[6]

Osteosarcoma is the most common primary malignant bone tumor in young and adolescents. It occurs most frequently in the second decade, during pubertal bone growth spurts, occurring in the metaphysis, mostly in the femur followed tibia.[14] In this study, we observed a similar finding of osteogenic sarcoma being the most common malignant bone tumor except that we have seen more cases in the tibia followed by femur. The wide range of age incidence between 7 and 66 years (youngest and oldest patients with osteogenic sarcoma, respectively) showed that all age groups may be susceptible. GCT of bone is a benign but locally aggressive tumor that usually involves the end of a long bone.[15] It most frequently occurs in young adults between 20 and 40 years of age with a slight female predominance.[16,17] In this study, GCT is the most common benign tumor with a slight male predominance, followed by Osteochondroma and chondroma, in sharp contrast to most publications that cited Osteochondroma being the most common benign tumor.[6,9,13,18,19] In fact, Ode Michael has quoted osteochondroma and GCT to be equal in number in their study (17.9% each),[6] whereas Niu et al.[20] have published similar higher incidence of GCT over osteochondroma in epidemiologic comparison of 9200 patients treated in China with 10 165 patients at Mayo Clinic, Rochester, Minnesota, USA. RMS is a malignant tumor of skeletal muscles that is usually seen in children. It comprises embryonal RMS that

Table 5: Anatomic location of bone and cartilage tumors

| Site of tumor            | Benign | Malignant | Total | Percentage |
|--------------------------|--------|-----------|-------|------------|
| Carpal-metacarpal        | 7      | 1         | 8     | 15.7       |
| Radius                   | 2      | -         | 2     | 3.9        |
| Ulna                     | 1      | 1         | 2     | 3.9        |
| Humerus                  | 3      | -         | 3     | 5.9        |
| Scapular                 | 1      | 2         | 3     | 5.9        |
| Tarsal-metatarsal        | 3      | -         | 3     | 5.9        |
| Tibia                    | 5      | 12        | 17    | 33.3       |
| Fibula                   | 2      | 2         | 4     | 7.9        |
| Femur                    | 2      | 5         | 7     | 13.7       |
| Pelvis                   | -      | 2         | 2     | 3.9        |
| **Total**                | 26     | 25        | 51    | 100        |

Table 6: Anatomic location of soft tissue tumors

| Site of tumor      | Benign | Malignant | Total | Percentage |
|--------------------|--------|-----------|-------|------------|
| Shoulder           | -      | 3         | 3     | 21.5       |
| Arm                | -      | 2         | 2     | 14.3       |
| Forearm            | -      | 1         | 1     | 7.1        |
| Hand               | 1      | -         | 1     | 7.1        |
| Pelvis             | -      | 1         | 1     | 7.1        |
| Thigh              | -      | 4         | 4     | 28.7       |
| Knee               | -      | -         | -     | -          |
| Leg                | -      | 1         | 1     | 7.1        |
| Foot               | 1      | -         | 1     | 7.1        |
| **Total**          | 2      | 12        | 14    | 100        |
usually affects children in their first 5 years of life, alveolar RMS that generally affects all age groups equally but making up a larger portion of RMS in children and anaplastic RMS (formerly called pleomorphic Rhabdomyosarcoma), that usually occurs in adults but very rare in children. RMS is the second most common musculoskeletal malignant tumor (24.4%) after osteogenic sarcoma in our study. This is similar to other findings that RMS is common in our environment, particularly in the pediatric age.\textsuperscript{[19,21]} We had only one case of Ewing’s sarcoma which is rare in the African and African-American population.\textsuperscript{[22-24]} Chondrosarcoma is malignant cartilaginous tumors that can occur at any age but more common in people older than 40 years. It may arise \textit{de novo} or secondary from an existing benign cartilaginous neoplasm. In this study, chondrosarcomas are seen mostly in adults, there was none in the pediatric age group.

Tibial bone is the most commonly involved site for malignant bone tumors followed by femur in this study, this presented a striking difference to most publications that cited femur as the most common site of involvement.\textsuperscript{[13,11,18-20,25,26]} The most common site for benign bone tumor was in the carpal metacarpal bone followed by tibia, whereas thigh and shoulder are the most common sites for both benign and malignant soft tissue tumors.

**Conclusion**

Osteogenic sarcoma is the most common primary malignant bone tumor followed by chondrosarcoma. RMS is the most common soft tissue sarcoma with a predilection to thigh and shoulders. GCT is the most common benign bone tumor in our center followed by osteochondroma. Carpal metacarpal bones are the most common site for benign bone lesion while tibial bone is the most common for malignant.

**Financial support and sponsorship**

Nil.

**Conflicts of interest**

There are no conflicts of interest.

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