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Barriers to Orthopaedic Oncology Care in a Resource-Constrained Setting: A Case Series of Four Patients

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Abstract

The successful management of bone and soft tissue sarcomas depends on patient, hospital, and societal factors. We present four cases that presented at a tertiary hospital in Nigeria, highlighting delayed presentation, financial constraints, inappropriate biopsy, and radiotherapy gaps: a female with fungating dermatofibrosarcoma protuberans lost to follow-up; a 17-year-old male with suspected osteosarcoma of the right thigh discharged against medical advice who died at home; a 30-year-old male with soft tissue sarcoma of the foot and a history of inappropriate incisional biopsy who subsequently underwent below-knee amputation; and a 60-year-old male with high-grade liposarcoma who developed local recurrence while awaiting radiotherapy and subsequently died. Poverty, poor infrastructure, and cultural beliefs intensify these barriers.

Keywords: Barriers; orthopaedic oncology; case series; tertiary hospital, Nigeria

Introduction

Musculoskeletal tumours are broadly classified into primary or secondary. Primary musculoskeletal tumours are abnormal growths derived from mesenchymal cells and arise in tissues derived from these cells, namely bone, cartilage, muscle, adipose tissue, fibrous tissue, nerves, and vascular structures.[1,2] Primary musculoskeletal tumours may be broadly categorised by biological behaviour (benign or malignant). Sarcomas make up just 1–1.5% of all malignant tumours, making them a rare type of cancer.[3] Although benign musculoskeletal tumours are far more common than malignant ones, malignant tumours pose a much greater risk due to their high rates of mortality and morbidity. Management of malignant musculoskeletal tumours poses a challenge to orthopaedic surgeons in developing countries due to poor public awareness, limited diagnostic facilities and therapeutic options, and a shortage of surgeons with specialised training in musculoskeletal tumour surgery.[4-6] Also, obtaining reliable data on musculoskeletal extremity tumours is challenging in our society because many patients never reach a hospital. For those who do, effective record-keeping is a problem.[5-6]

We have categorised our experiences of organisational barriers into patient-related, unorthodox intervention-related, provider-related, and health-institution-related. Patient-centered barriers are late presentation, ignorance of disease severity, discharge against medical advice (DAMA), loss to follow-up, and financial constraints.[5-7] Unorthodox intervention-related barriers include consultations with traditional bone setters or healers who apply herbal remedies, perform incisions, and manipulate tumours, causing diagnostic delays and poor outcomes. The provider-related barriers include difficulty in establishing and sustaining a multidisciplinary team, reliance on inadequate radiological procedures, inconclusive or non-diagnostic pathological reports from tumour pathologists, and interventions performed without appropriate oncological planning before formal

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referral to the tumour team.[6,8]

On the institution-centered front, the absence of relevant diagnostic and therapeutic infrastructure compromises musculoskeletal tumour care. These include the lack of imaging modalities such as computed tomography (CT) scans, magnetic resonance imaging (MRI), or positron emission tomography (PET), all of which help with tumour staging and the detection of metastases. There are insufficient specialized pathological services, including frozen section facilities and limited access to immunohistochemistry (IHC). There is also a scarcity of radiation oncology facilities, limiting both limb-salvage options and palliative care for advanced disease.[8-10] The government faces challenges in establishing a functional musculoskeletal tumour service due to ineffective health insurance, poor hospital funding, scarce research grants, low staff motivation, and excessive workloads.[6] These barriers cause diagnostic errors, inappropriate surgeries, high local recurrence rates, avoidable amputations leading to delayed diagnosis, incomplete treatment, and avoidable morbidity and mortality.[11-12]

The University of Uyo Teaching Hospital (UUTH) serves as the sole tertiary referral center in Akwa Ibom State, Nigeria, accepting patients from both the state and surrounding regions. During the development of our orthopaedic oncology service, we have consistently encountered these barriers. This case series presents four patients referred to our service at UUTH. Each case illustrates a barrier to effective care: late presentation, discharge against medical advice, inappropriate biopsy, and lack of a radiation oncology facility.

Case Presentations

Case 1

A female patient in her early thirties presented with a seven-year history of a recurrent growth on the left forearm (Figure 1a), with no antecedent trauma. Before presentation, she had consulted drug stores, religious houses, and a traditional healer, who made incisions on the mass and applied various topical and traditional remedies, all to no avail. She also had three prior excisions of the tumour at a peripheral clinic, the most recent being four years before presentation. Physical examination revealed a large, fungating, ulcerated mass measuring 18 cm × 20 cm over the ventral surface of the proximal two-thirds of the left forearm. The mass was friable, bled easily on touch, and was associated with a malodorous discharge. Despite the advanced appearance of the lesion, elbow range of motion was preserved, and neurovascular status remained intact. Systemic examination was otherwise unremarkable. Magnetic resonance imaging (MRI) of the forearm (Figure 1b) demonstrated a large lobulated mass measuring 14 cm × 10 cm × 7.2 cm, adherent to the overlying skin but without evidence of fascial or muscle invasion. Chest radiography and abdominopelvic ultrasonography showed no evidence of metastatic disease, while routine laboratory investigations were within normal limits. However, contrast-enhanced CT of the chest and abdomen could not be performed due to financial constraints. A core needle biopsy was performed, and histopathology was initially reported as inflammatory fibrosarcoma. The patient underwent wide local excision with soft tissue reconstruction (Figures 1c and 1d). Postoperative histology, however, revealed dermatofibrosarcoma protuberans with positive tumour margins. The patient was counselled on chemotherapy and radiotherapy but was subsequently lost to follow-up.

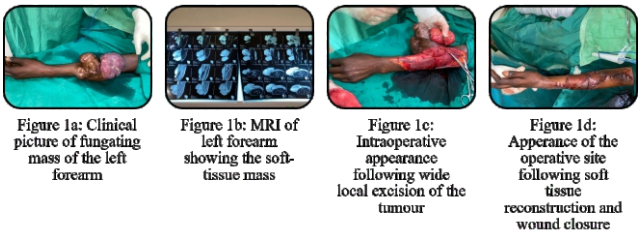

Figure 1a: Clinical picture of fungating mass of the left forearm

Figure 1b: MRI of left forearm showing the soft-tissue mass

Figure 1c: Intraoperative appearance following wide local excision of the tumour

Figure 1d: Apperance of the operative site following soft tissue reconstruction and wound closure

Figure 1: Clinical, radiological, and operative features for Case 1.

Case 2

A 17-year-old male student presented with an 18-month history of progressive right thigh swelling, associated pain, and progressive difficulty walking attributable to the increasing size and weight of the affected limb. Physical examination revealed a cachectic young man with significant weight loss. Local examination of the right thigh showed globular enlargement with a circumference of 78 cm, multiple scarification marks indicative of prior traditional bone setter consultations, and a firm-to-hard mass containing areas of fluctuance (Figure 2a). The overlying skin was stretched and shiny, with prominent superficial veins. Inguinal lymphadenopathy was noted in the right groin, suggesting possible regional lymphatic spread of the

primary tumour. Chest examination revealed reduced breath sounds and coarse crackles over the right lower lung field, raising suspicion of pulmonary metastases or an associated pleural effusion. Other systems were otherwise unremarkable. A radiograph of the right femur (Figure 2b) demonstrated mixed lytic-sclerotic lesions with Codman's triangle and sunburst periosteal reaction, findings highly suggestive of osteosarcoma. The patient was unable to afford further investigations (chest X-ray, biopsy, MRI, and CT staging) and was subsequently discharged against medical advice (DAMA). Follow-up with relatives later disclosed that the patient had died at home.

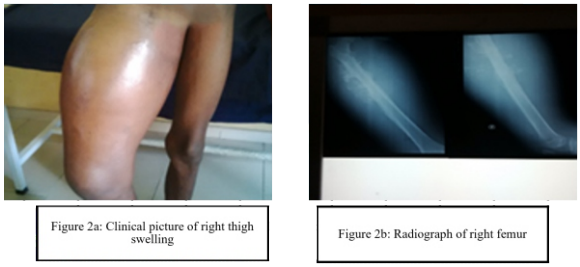

Figure 2a: Clinical picture of right thigh swelling

Figure 2b: Radiograph of right femur

Figure 2: Clinical picture and radiograph of the right thigh for Case 2

Case 3

A 30-year-old male presented with a soft tissue mass of the right foot (Figures 3a and 3b). The mass had been present for three years, gradually enlarging. Approximately six months prior to presentation at our facility, the patient had undergone an incisional biopsy of the mass at a peripheral hospital; however, the biopsy site subsequently failed to heal, with the mass progressing to become ulcerated, fungating, and malodorous. Systemic examination was otherwise unremarkable. Haematological and biochemical investigations were within normal limits. The patient could not afford magnetic resonance imaging (MRI) or other staging investigations due to financial constraints. Core needle biopsy of the mass yielded a diagnosis of invasive malignant mesenchymal neoplasm. The patient subsequently underwent below-knee amputation; histopathological examination of the amputation specimen confirmed the diagnosis of malignant mesenchymal neoplasm. However, immunohistochemistry (IHC) could not be performed due to lack of finances, hindering further subtyping and prognostic characterisation. This patient was also lost to follow-up. The incisional biopsy was performed without pre-biopsy imaging or adherence to oncology biopsy principles. Referral to a musculoskeletal oncology centre was also delayed, preventing timely specialist care.

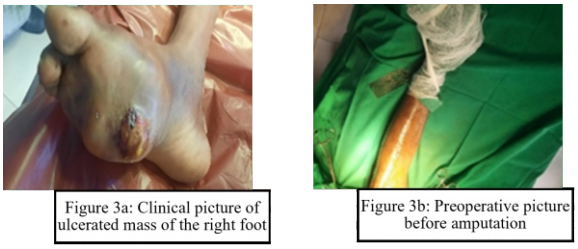

Figure 3a: Clinical picture of ulcerated mass of the right foot

Figure 3b: Preoperative picture before amputation

Figure 3: Clinical Pictures for Case 3

Case 4

A 60-year-old male presented with a progressively enlarging mass on the anteromedial aspect of the distal third of the right thigh, which had been present for five years (Figure 4a). The mass was initially small and painless but gradually increased in size, becoming more prominent and causing a dull, aching discomfort, particularly after prolonged walking or standing. There was no history of antecedent trauma or constitutional symptoms. Clinical examination revealed a firm, non-tender, mobile mass measuring approximately 10 cm × 8 cm, fixed to the underlying deep fascia with ill-defined borders, and the overlying skin had a lesion at the centre. Distal neurovascular examination was intact. Systemic examination was unremarkable. MRI revealed an enhancing lesion in proximity to the femoral neurovascular bundle (Figure 4b). Staging investigations showed that the liver and lungs were free of metastatic disease. Histology confirmed a high-grade tumour, liposarcoma. Wide local excision with en bloc resection of the tumour mass was performed (Figure 4c). Histopathological examination showed that the surgical margin was contaminated with microtumour at the upper anteromedial portions. The patient was discharged two weeks postoperatively following satisfactory primary wound healing (Figure 4d). He was referred for adjuvant radiotherapy at a centre in another region of the country, as no functional radiotherapy facilities were available locally. At that time, only two radiotherapy centres were operational nationwide, resulting in prolonged waiting time in accessing radiotherapy, during which the patient developed local recurrence (Figure 4e). He subsequently died

while still undergoing radiation treatment.

Figure 4a: Clinical picture showing the mass

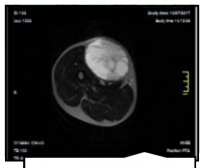

Figure 4b: MRI showing the mass

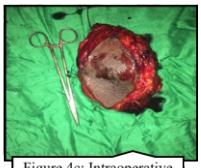

Figure 4c: Intraoperative picture of the excised mass

Figure 4d: Immediate postoperative picture

Figure 4e: Post-local recurrence picture

Figure 4d-e: Immediate post-operative and post-local recurrence pictures in Case 4

Discussion

Orthopaedic oncology, an art and science of musculoskeletal tumour management, is a relatively recent addition to the orthopaedic subspecialty practice in our environment. Globally, over the last few decades, the field has advanced, moving away from a historical reliance on amputation for local control of malignant tumours toward limb-salvage strategies that offer oncologic safety when relevant human and technical resources are available.[12] The success and prognosis of musculoskeletal tumour management depend on early diagnosis and a multidisciplinary treatment approach. The musculoskeletal tumour management protocol at our centre includes clinical evaluation, laboratory and imaging investigations, biopsy with histological diagnosis, definitive surgical treatment, and subsequent referral to oncology centres in other states that offer chemotherapy and radiotherapy. Additionally, for complex cases requiring endoprosthetic reconstruction, including mega prosthesis placement after bone tumour resection or more extensive procedures involving major neurovascular structures, patients are referred to centres with vascular surgery and reconstructive expertise. Though this cross-state referral model represents a strategy to overcome local resource limitations, it also introduces the challenge of treatment delays, loss to follow-up, and financial burdens from travel and accommodation.

The case presentations highlight barriers that affect the delivery of orthopaedic oncology services in a resource-limited setting. Though each case highlighted a distinct clinical scenario, they altogether revealed recurring barriers (patient-related, unorthodox intervention-related, provider-related, and health institution-related) that are widely reported across low- and middle-income countries (LMICs). (5-8) Studies from Nigeria and other LMICs report delayed presentation, where patients with musculoskeletal tumours often arrive at the hospital late with advanced disease. The contributing factors include poor health literacy, which impairs early symptom recognition; cultural beliefs that attribute tumours to supernatural or witchcraft-related causes, thereby favouring spiritual over medical intervention; financial constraints that restrict access to hospital care; consultations with traditional bone setters, whose harmful practices, such as massaging or incising the tumour, may promote tumour dissemination; and slow referral systems due to wrong diagnoses and the absence of a clear referral protocol for suspected cases. The consequences of delayed presentation are evident across all cases in this series. All the patients in this series presented beyond one year of symptom onset, showing the diagnostic and referral delays in our setting. These delays ranged from eighteen months to five years and were associated with advanced local disease, increased surgical complexity, and, in one case, preclusion of limb salvage. For sarcomas, delay is associated with larger tumour size, distant metastasis, increased surgical complexity, higher local recurrence rates, and worse overall survival.[9-13]

Financial constraint is a challenge in LMICs, where a suspected diagnosis of a musculoskeletal tumour often cannot be confirmed because patients cannot afford the necessary investigations and treatment.[5,14] The financial burden of musculoskeletal tumour care in LMICs, including Nigeria, is overwhelming; most patients rely on out-of-pocket payments, as health insurance coverage is limited.[15-18] This results in catastrophic health expenditure that pushes many families into poverty and treatment abandonment, as seen in case presentation 2, who had to leave against medical advice due to financial constraints. Health Maintenance Organisations (HMOs) routinely exclude CT, MRI, PET-CT, radiotherapy, chemotherapy, resection surgeries, and mega prosthetic reconstruction, deeming these interventions too expensive despite their status as the

standard of care in developed economies.[6-7,19]

Discharge against medical advice (DAMA) is defined as a patient's decision to leave the hospital before the treating physician has authorized discharge.[20] The factors that drive patients to discharge themselves against medical advice include financial constraints related to the high cost of cancer diagnostics, treatment, prolonged hospital stays, and complex limb-salvage procedures, which compel patients to seek cheaper but non-curative alternatives, as well as cultural and spiritual beliefs and a lack of insight into the aggressive nature of malignant tumours.[5] Patients who leave against medical advice do not receive complete treatment for their pathology and have poorer oncological outcomes and are more likely to present later with advanced, incurable disease.[21-22] This pattern was seen in case presentation 2, where the patient died at home, never having received a confirmatory diagnosis or definitive treatment. Addressing these factors, especially financial constraints, is essential to improving outcomes in musculoskeletal oncology.

Inappropriate biopsy techniques performed by non-specialists lead to adverse outcomes, including local recurrence, distant metastasis, and compromise of limb salvage.[23-24] A biopsy should be planned with the same care as the definitive procedure and should only follow a complete clinical and radiographic evaluation.[25] Ideally, the same team responsible for definitive treatment should perform the biopsy. Studies in the literature have not definitively identified the optimal biopsy approach for musculoskeletal tumours. However, core needle biopsy is generally preferable to open incisional biopsy because it is less invasive. The absence of surgical wounds permits immediate initiation of adjuvant therapies following pathological confirmation. Additionally, it is more cost-effective and confers a lower risk of tumour spillage.[26-27] In our setting, due to shortages of specialised oncology centres and tumour surgeons, patients often undergo biopsies at non-specialist centres, deviating from oncological principles with devastating consequences, as in Case 3.[5] Tumour contamination, wound breakdown, and disease progression render salvageable limbs unsalvageable.

Evaluating musculoskeletal tumour cases requires a multidisciplinary approach.[5,28] Diagnostic workup includes laboratory investigations, imaging, and biopsy for histologic confirmation. Surgical resection is the mainstay of sarcoma treatment, while systemic therapies, including chemotherapy and radiotherapy, are integrated based on tumour biology and metastatic potential.[29] Effective management is best provided through coordinated multidisciplinary care (MDC) that integrates expertise from radiology, pathology, orthopaedic oncology, medical oncology, radiation oncology, oncology nurses, and physical therapy.[30-31] Multidisciplinary care can promote earlier detection, optimise preoperative planning, and improve quality of life. However, in our settings, this is limited by a shortage of trained health personnel and specialists, the apathy of health workers, competing clinical demands, and significant gaps in diagnostic and treatment infrastructure. Additionally, there is a lack of access to essential imaging modalities, such as plain radiography, ultrasound, CT, and MRI, as well as basic laboratory investigations, including histopathology, immunohistochemistry, and molecular testing. Consequently, in some of our centres, patients undergo surgery without adequate preoperative staging, biopsies are performed without image guidance, and adjuvant therapies are prescribed without knowledge of tumour biology, grade, or margin status, all of which compromise outcomes. Establishing a tumour board with regular physical or hybrid meetings can help to address the challenges of implementing MDC. A tumour board is a multidisciplinary meeting where cancer specialists and allied health professionals regularly review newly diagnosed and complex cases to harness expertise for optimal treatment planning.[32-34] In our setting, where specialists are scarce, hybrid meetings have emerged as the preferred solution. This model works because it acknowledges our reality: travel is expensive, time is scarce, and we cannot always gather everyone in one room. A monthly hybrid tumour board is achievable. It builds collaboration gradually, standardizes care, and gives patients the benefit of multidisciplinary thinking.

At the institutional level, the absence of basic and advanced diagnostic and therapeutic infrastructure severely compromises musculoskeletal tumour care. Immunohistochemistry (IHC) is among the most valuable staining techniques in biomedical research, clinical diagnosis, cancer management, and disease monitoring, as it enables clinicians to determine the tissue of origin and thereby guide appropriate therapy.[35] Despite its role in cancer diagnosis and

treatment, Nigeria's application remains profoundly limited, leading to diagnostic delays compared with developed nations.[36] This results in health system delays, which lead to worse clinical outcomes. The absence of radiation oncology facilities restricts both limb-salvage options, where adjuvant radiotherapy reduces local recurrence risk in high-grade sarcomas, and palliative care for advanced disease.[6,37-38] Even when surgical resection is successful, lack of access to timely radiotherapy can lead to local recurrence, as seen in case presentation 4. Additional institutional deficits include the lack of a dedicated bone and soft tissue tumour registry (impeding epidemiological tracking and quality improvement) and inadequate operating theatre equipment for wide resections and endoprosthetic reconstruction. These infrastructural shortcomings collectively perpetuate delayed diagnosis, incomplete staging, suboptimal surgical planning, and poor oncological outcomes.[39] Addressing the organisational challenges identified in this series requires a coordinated, multi-sectoral response that involves the government, private sector stakeholders, and international development partners.[40-43]

Conclusion

This case series highlights some barriers in organizing musculoskeletal oncology care in a resource-constrained environment. They lead to adverse outcomes, including delayed diagnosis, distant metastasis, incomplete staging, positive surgical margins, local recurrence, amputations, and preventable death. The way forward requires coordinated action across multiple fronts. The government must expand existing cancer financing mechanisms, such as the Cancer Health Fund and the National Health Insurance Association, to include musculoskeletal tumours, and invest in radiotherapy infrastructure, diagnostic equipment, and workforce development. Public-private partnerships can help bridge the infrastructure gap by enabling access to diagnostic and therapeutic services and ensuring their availability to all patients, not only those who can afford to pay.

Professional associations must advocate for dedicated bone and soft tissue tumour registries, bulk procurement of endoprosthetic implants, and formal fellowship training in orthopaedic oncology to counter the brain drain that has depleted the surgical workforce. Also, social work services can help families access available financial support and reduce loss to follow-up. Finally, structured education and awareness programmes on musculoskeletal tumours should be provided for both the general public and healthcare providers, with continuing medical education for non-specialist physicians and general surgeons to promote early recognition and prompt referral to specialist centres.

Disclosures

Patients' consent for publication was obtained. All patient identifiers have been anonymised. This case series was conducted in accordance with the ethical standards of the institutional research committee.

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